User Manual

ServerView RAID

Version 2.1

© 2006 Fujitsu Siemens Computers

Contents

1 Basics....1
1.1 Supported RAID Types....1
1.2 RAID Controller Functions....5
1.3 Supported Controllers and Devices....6

2 Login....8
2.1 Login....8
2.2 Installing a Security Certificate....9
2.3 System requirements....10

3 The User Interface....11
3.1 Elements of the User Interface....11
3.2 Event Status Indicators and Icons....12

4 Logical Drives....14
4.1 Creating Logical Drives....14
4.2 Modifying Logical Drives (migrating)....16

5 Hot Spares....18
5.1 Managing Hot Spares....18

6 Properties....20
6.1 Displaying and Modifying Properties....20

7 Actions....32
7.1 Executing Actions....32

8 Events....38
8.1 Displaying Events....38
8.2 SNMP Traps....38

9 Help....63
9.1 Help....63
9.2 Online Help....63
9.3 amCLI....64
9.4 Frequently Asked Questions FAQs....74

10 Glossary....76

1 Basics

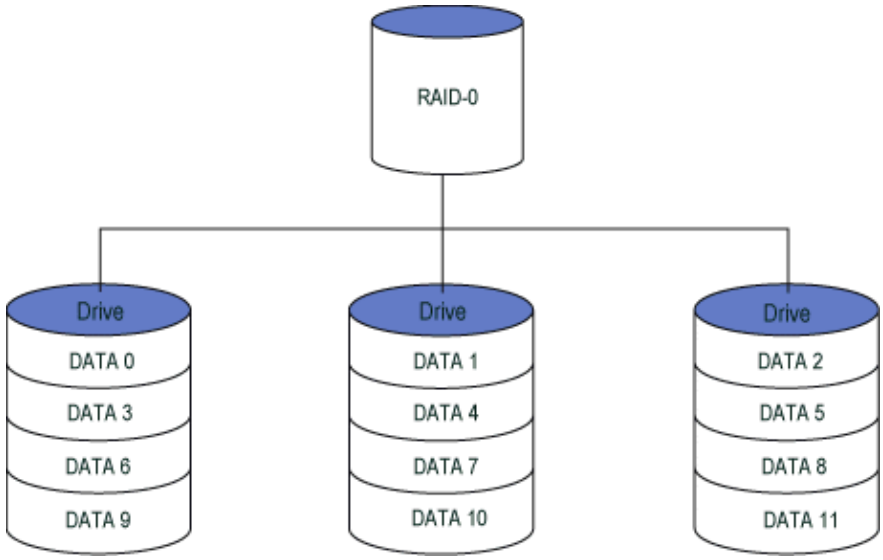
1.1 Supported RAID Types

RAID is an acronym for "Redundant Array of Independent (or Inexpensive) Disks". RAID's objective is to combine hard disk drives and thus offer more capacity and performance and/or reliability than can be achieved with a single drive.

The RAID controllers supported can configure for example the following RAID types:

1.1.1 RAID−0

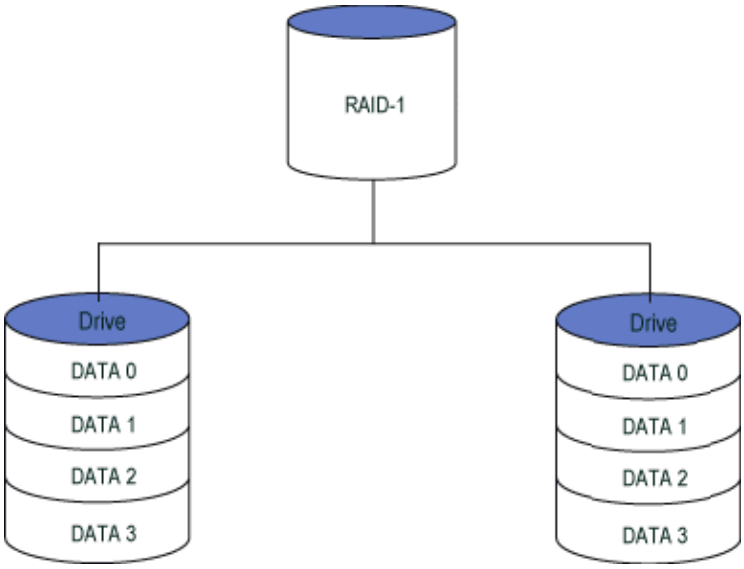
A RAID−0 is created by distributing (striping) data over two or more hard disk drives. Single striping (like that just mentioned) does not generate any redundancy for protecting data, but by distributing the data over multiple drives it provides the best read/write performance of all RAID types.



1.1.2 RAID−1

A RAID−1 consists of two hard disk drives. The data stored on the array is written to both drives. The mirroring of data provides a redundancy which ensures that no data is lost if a drive fails. However, only half the total capacity of the two disks is available because all data is written to both drives.

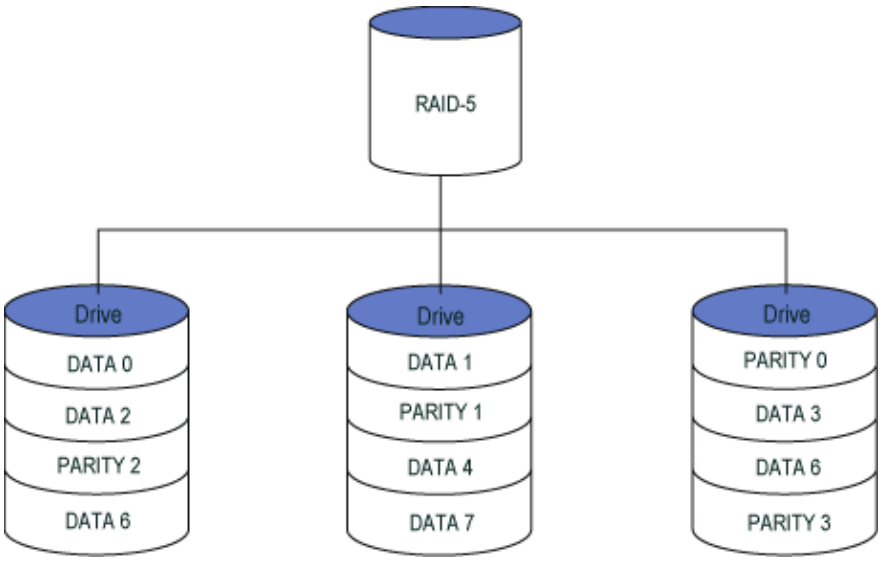
In comparison with a single drive RAID−1 offers no benefits in terms of write performance, but because the data is distributed over two drives it provides advantages as regards the read performance (and data security).



1.1.3 RAID−5

At least three drives are required to create a RAID−5. As with a **RAID−0** the data is distributed over various drives, but in the case of RAID−5 the capacity of a drive is used to store parity information. The parity information is also distributed over all the drives. The controller generates this parity whenever data is written to the array and distributed over all the drives. If a drive fails, the content of the failed drive can be restored from the data and the parity of the remaining drives.

The use of parity minimizes the capacity costs of redundancy. As only one drive is used to store the parity, two thirds of the total capacity can still be used for data. In the case of arrays with more drives the reduction of the usable total capacity is less. With RAID−5 the write performance is lower because parity data must first be generated for each write process. The read performance is good, however, because the requests are distributed over all drives.

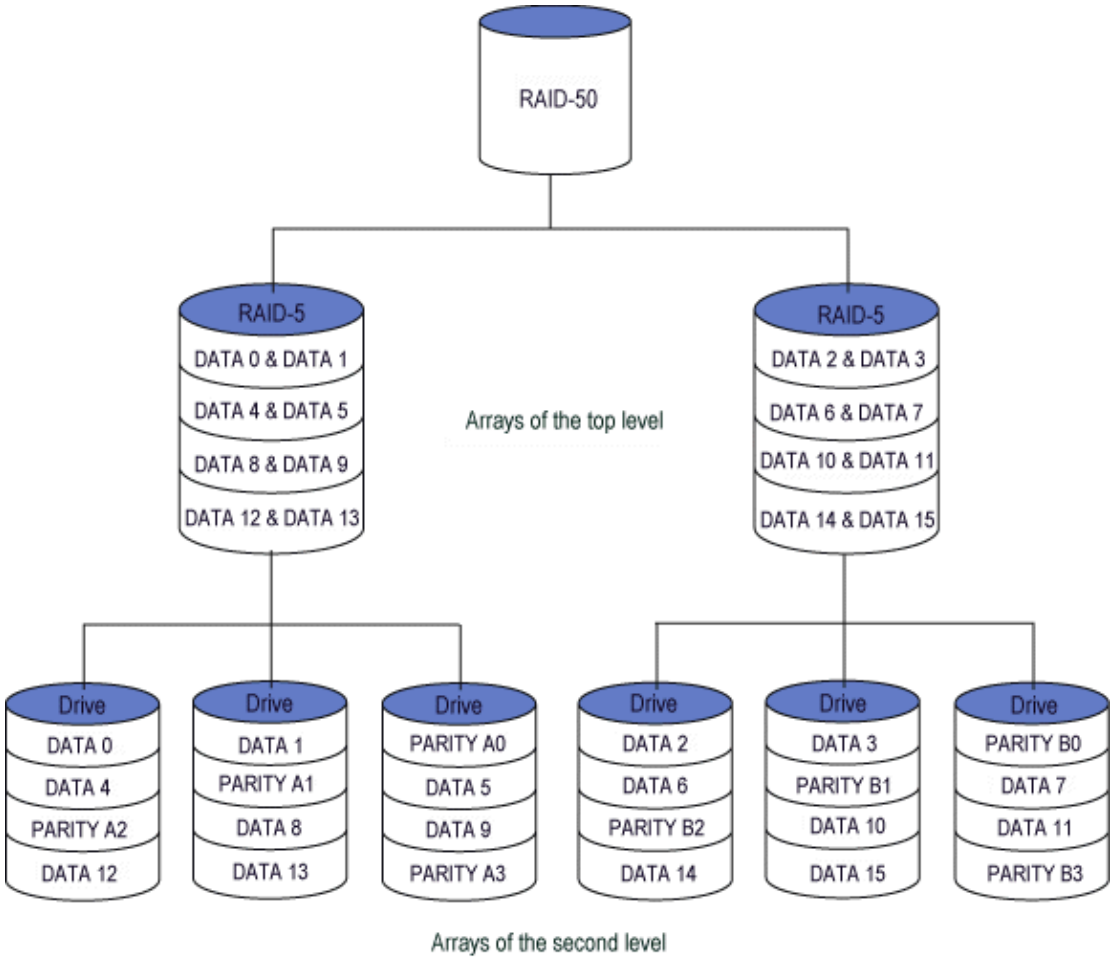


1.1.4 RAID−10

A RAID−10 is a dual−level array which is created by two or more equal−sized arrays of the type **RAID−1** being used to produce a **RAID−0**. A top−level array (RAID−0) shares the total data load with the second−level array (RAID−1), thus enhancing both the read and the write performance. As second−level arrays are RAID−1s, redundancy is also offered. However, only half the total capacity of the drives used is available in the array.

1.1.5 RAID−50

A RAID−50 is a dual−level array which is created by using at least two arrays of the type **RAID−5** to form a **RAID−0**. The top−level array (RAID−0) shares the data with the second−level array (RAID−5), thus enhancing both the read and the write performance. Since the second−level arrays use RAID−5, the parity provides efficient redundancy.



1.1.6 Single Volume, JBOD

A single volume consists of a single hard disk drive. In the actual sense of the word this is not a real RAID type and is thus also referred to as a "none−RAID". According to the latest definition of the Storage Networking Industry Association a JBOD (Just a Bunch of Disks) is one of these although the term can sometimes refer to multiple physical disks.

1.1.7 Concatenation

A concatenation is formed by interconnecting two or more hard disk drives. In this case the drives can have different capacities and are interconnected from beginning to end. A global volume offers no redundancy and no performance benefits compared to a single drive; it is seen in the system merely as a correspondingly large drive.

1.1.8 RAID Volume

A RAID volume is created by interconnecting two or more arrays of the same type. In contrast to the dual−level arrays described above, arrays in a RAID volume need not have the same capacity but are interconnected (as described above under concatenation).

Note: Sometimes the term "volume" is also used as a synonym for array.

1.2 RAID Controller Functions

In the context of RAID terms are used and functions described which are explained in detail below.

1.2.1 Embedded RAID / Host RAID

"Embedded RAID" means hardware (ASIC) is provided on the RAID controller which relieves the system CPU (host) of RAID controller functions. As a result the server can devote itself to processing its core applications and the overall performance is improved. If this hardware support is not available, the term "host RAID" is used.

1.2.2 Drive Usage

For simplicity's sake the different RAID types under **Supported RAID Types** all use complete disk drives of the same size. In fact the usable capacity of each drive is limited by the disk drive with the lowest capacity if drives with different capacities are used.

If, for example, a **RAID−1** is created from a 160−Gbyte and an 80−Gbyte drive, only half the capacity of the larger disk can be used, thus limiting it to 80−Gbyte. Furthermore, a small part is removed from each drive for the so−called RAID Signature.

1.2.3 RAID Signature

RAID controllers use a small segment at the beginning or end of each connected drive to store information on the drives and arrays attached to the controller. This segment is also referred to as RAID Signature and is not available for general use for saving user data.

1.2.4 Morphing

Some RAID controllers support the modification (morphing) of existing logical drives through expansion options, migration of one RAID type to another, and modification of the stripe size. The migration options depend on the RAID controller used.

Further information is provided under **Modify Logical Drives**.

1.2.5 Online Capacity Expansion

Some operating systems, e.g. Windows XP, Windows 2000 and Windows NT, support Online Capacity Expansion (OCE). OCE means that the additional capacity after a logical drive has been expanded can be used without rebooting the system. Details on the additional storage capacity are provided in the documentation for your operating system.

1.2.6 Cabinets

RAID controllers also support external drive enclosures which use SES or SAF−TE enclosure administration hardware. This extended hardware support enables additional administrative information for the enclosure, e.g. fan speed, temperature and voltage. Such enclosures generally offer further properties, e.g. hot swap.

1.2.7 Hot Swap

Either through the use of SATA technology or the above−mentioned drive enclosure RAID controllers support so called hot swap, i.e. disk drives can be replaced during ongoing operation without the system having to be rebooted.

Note: Hot swapping of hard disks is possible only if a disk was placed *Offline* beforehand.

1.2.8 Hot Spare

A hot spare is a physical drive which is available in a redundant logical drive as a replacement for a failed disk. If a drive fails the hot spare replaces it and the logical drive is recreated. The data is then reconstructed on this new disk during ongoing operation. Until reconstruction has been completed the access to the data takes a little longer but is possible at any time.

RAID controllers support the following hot spare types:

- Global hot spares support every logical drive for which the drive provides sufficient storage capacity for backup purposes.
- Dedicated hot spares support only logical drives which it has been assigned to back up.

Note: Some RAID controllers automatically assign newly added and unused drives to the global hot spares.

1.3 Supported Controllers and Devices

ServerView RAID permits administration of various RAID controllers and the devices attached to them.

1.3.1 Supported Controllers

ServerView RAID supports all current variants from the different vendors. This support covers SCSI and SATA, as well as RAID controllers on the mainboard and the expansion boards, and solutions with **Host RAID**. ServerView RAID recognizes the implementation involved and offers only those administrative options which are actually supported.

Most controller functions which are supported are described in this online help. However, as not all controllers always support all functions and new functions may be added through new controllers or driver software updates, it is helpful also to refer to the release information for the controller concerned and the current release status of ServerView RAID.

1.3.2 Supported SCSI Devices

In addition to SCSI hard disk drives SCSI RAID controllers also support tape drives.

1.3.3 Supported Serial ATA Devices

Serial ATA −RAID controllers support only SATA hard disk drives.

1.3.4 Supported SAS Devices

Serial Attached SCSI replaces the previous parallel SCSI interface. SAS RAID controllers support both SAS and SATA hard disk drives. Please take note of the relevant controller release information.

2 Login

2.1 Login

You log in as follows:

1. ServerView RAID must be installed on the system to be administered. If this has not been done, please install ServerView RAID.

   Note: Under Windows you find or start the local application by clicking on *Start* > *Programs* > *Fujitsu Siemens* > *ServerView RAID Manager Start.*

2. If ServerView RAID is already installed on the target system, you can also start the RAID Manager directly via the browser. In the address line, enter the IP address or the name of the system followed by port number 3173 (example: *https://<name_or_ip>:3173*). Confirm your input using the *CR* key to enable you to access the required system. This works both locally and from a remote system.

   Note: When you run ServerView RAID for the first time after installation, you must install a security certificate. Information on doing this is provided under **Installing a Security Certificate**.

   After a connection has been successfully set up to the system the following login screen is displayed in the browser.

   Note: By the *Help* button at the top right can be opened the online help directly without the user needing to log in.

3. If required, choose a different language in the login screen by selecting the related national flag.

4. Enter the user name and the password which are to be used to log into this system. Then click on *Login* to enter the **RAID Manager**.

For authentication purposes ServerView RAID uses the interfaces provided by the operating system of the server to be monitored. Users who have been set up with administration rights can perform configuration via ServerView RAID. Nonprivileged users obtain just a read−only view of the server (more information **here**). If the configuration details of special users who do not have administration rights are to be accepted, this can be done as follows:

set up a new user group with the name "raid−adm"

add an existing user to this group

If you use a proxy server for the Internet you must bypass it to enable you to access the server. If you know the IP address of the system that you wish to administer remotely, you might select the following, for example, for

- Internet Explorer:
  Tools > Internet Options > Connections > LAN/Settings& > Use a proxy server for your LAN/Advanced& and enter the IP address of the system to be administered in the *Exceptions* area.

- Netscape/Firefox:
  Edit > Settings > Advanced > Proxy Server > Manual Proxy Server Configuration > No Proxy and enter the IP address of the system to be administered.

2.2 Installing a Security Certificate

If you do not install a security certificate when ServerView RAID is installed, you must do so the first time you start it. Proceed as follows to do this.

1. If the *Security Alert* window is displayed, click on *View Certificate*.

2. In the next window, *Certificate*, click on *Install Certificate*.

3. In the window then displayed, *Certificate Import Wizard*, click on *Next*.

4. The content of the *Certificate Import Wizard* window changes. Choose the default setting *Automatically select the certificate store* and click on *Next*.

5. The content of the *Certificate Import Wizard* window is changed again. Click on *Finish*.

6. A *Security Warning* window is displayed. Confirm this by clicking on *Yes*.

7. In the next window of the *Certificate Import Wizard* which is displayed click on *OK*.

8. You are then returned to the *Certificate* window from step 2. There click on *OK*.

9. You then return to the *Security Alert* window from step 1. There click on *Yes*. You have now completed the process for creating and saving the certificate.

10. Finally the Java runtime environment will request you to accept the certificate once for the current session by clicking on *Yes* or for all further sessions by clicking on *Always*. By doing so you agree to an encrypted exchange of data and are then taken to the **Login Screen**.

If only a red X can be seen at the top left−hand corner of the screen when ServerView RAID is started, this means that installation of the security certificate took too long. In this case close the browser window and restart ServerView RAID.

2.3 System requirements

2.3.1 Hardware

At least 16 MB of disk space must be available on the server for installation purposes. Depending on the settings for ServerView RAID, disk space must also be provided for the log files.

The client must be a PC that offers at least 500 MHz and 256 MB RAM.

2.3.2 Software

A Sun Java Runtime Environment (JRE) e 1.5.0 is required for the GUI.

The operating systems of the servers involved are the Windows and Linux versions released or permitted by Fujitsu Siemens Computers.

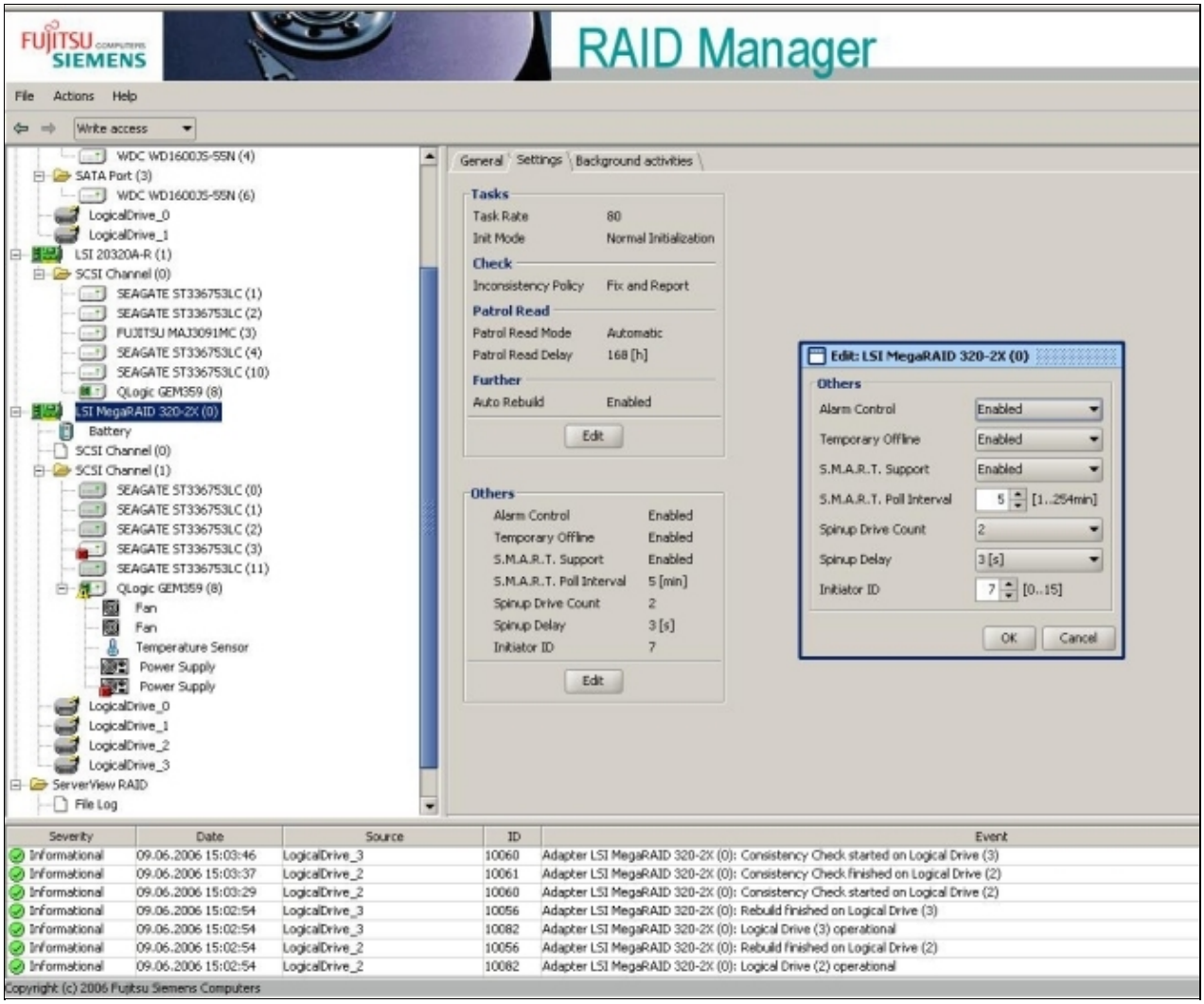
The browsers permitted are Internet Explorer Version 6 or higher and Mozilla−based browsers such as Netscape or Firefox.

ServerView RAID may only be used on the hardware and software specially released for it. Further details can be found in the release information.

3 The User Interface

3.1 Elements of the User Interface

The figure below shows the ServerView RAID main window with the typical controls.



Note: Depending on the operating system, browser, monitor and color scheme used there may be differences between this figure and the display on your screen.

- At the top of the window you will find the **1st menu line** with the menu items:
  - ♦ File
  - ♦ **Actions**
  - ♦ **Help**

  The menu item *File* enables you to terminate your session and return to the **login screen** or to ServerView Start if you started the application there.

After you have selected *Actions* or *Help* a window is opened which contains information or, depending on the object selected, actions.

Possible actions are displayed to you when you right−click on an object in the tree structure.

- Below the 1st menu line you will find the **2nd menu line**. You can use the two arrows to go one step forward or back. The button next to the two arrows enables you to change the write or read access to the objects.

  The first user automatically has read/write authorization. Every subsequent user only has read authorization, but provided they have appropriate administration rights can obtain write authorization. The user who had write authorization up to this point is then informed of this.

- Beneath the two menu lines the window is divided into two halves. In the left−hand half all the objects of a system are displayed in a **tree structure**. In the right−hand half information on the objects selected in the tree structure are displayed in an **object window**.

  The object window on the right contains (depending on the object selected) one or more **tabs**:

  - *General*
    Contains general data on an object (IP address, operating system, etc.) which you *cannot* change.

  - *Settings*
    Contains object settings which you can change. When you click on the *Edit* button a dialog box opens in which you can make the changes.

  - *Structure*
    Contains an overview with information on the structure of an object.

  - *Background activities*
    Contains activities that are currently running on an object such as a Patrol Read on an adapter.

- At the bottom edge of the user interface you will find an **event window**. This displays the latest events of all the RAID controllers which are managed by ServerView RAID. The delimiter bar enables you to enlarge or reduce this window.

An overview of the icons used in the tree structure can be found **here**.

3.2 Event Status Indicators and Icons

3.2.1 Event Status Indicators

The following status indicators in the event window of the ServerView RAID main window indicate the weight of a reported event.

Information Warning Error

3.2.2 Icons

The following icons represent an object (device) in the tree structure of the ServerView RAID main window. This icons can also contain various combinable flags which display the status or property of an object. An object without an additional indicator is always in the status OK.

Table of the object icons

Icon	Meaning
	Adapter
	Battery
	Beeper
	CD−ROM/DVD drive
	Drive (not used)
	Drive (used)
	Fan
	Jukebox
	Logical drive
	Network device
	Optical drive
	Power supply with fan
	Printer
	Processor
	Scanner
	Single drive
	Thermometer
	WORM drive

Table of the additional indicators

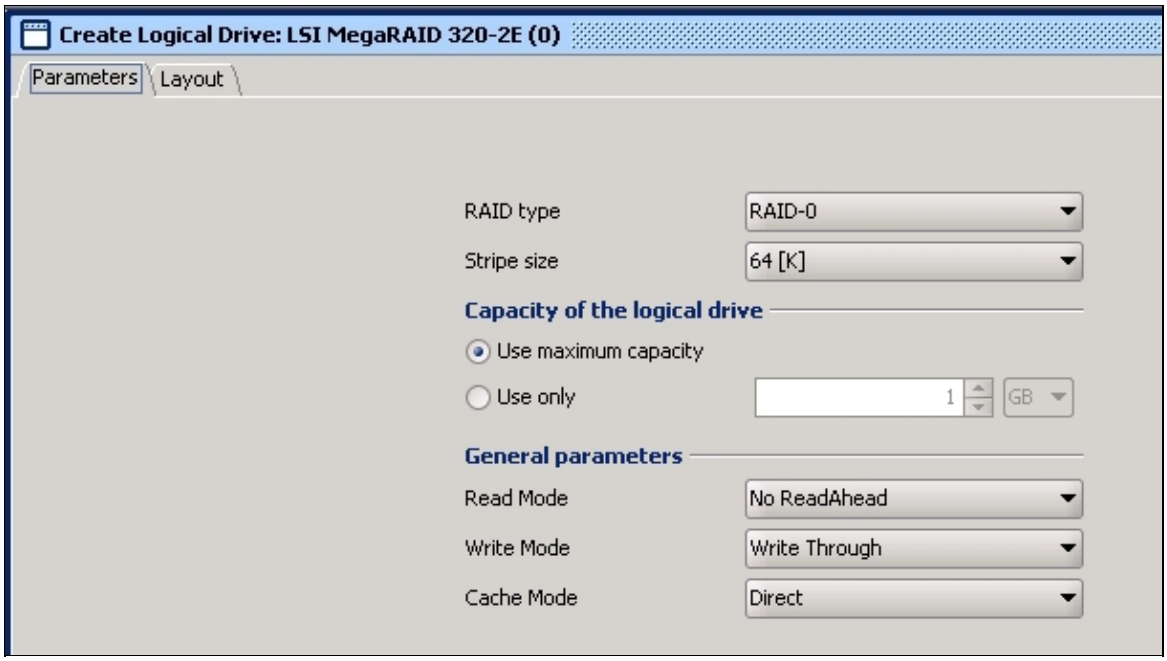
Indicator	Example	Meaning
x character		Fan in "critical status
! character		Power supply in "warning" status
Yellow halo		Disk with "flashing" LED status (in order to pinpoint it)
Plus character		Dedicated hot spare hard disk
1010		Hard disk rebuilding
(Combination)		Logical drive rebuilding and in the "flashing" and "critical" statuses

4 Logical Drives

4.1 Creating Logical Drives

Before you create a logical drive with ServerView RAID, ensure that you are familiar with the **Supported RAID Types** and also know precisely which RAID type is most suitable for your application.

Select a controller in the tree structure and start the *Create Logical Drive* action (via the pulldown menu of the *Actions* button or with a right mouse click). A dialog box is opened as in the example below for an LSI controller.



Depending on the controller and RAID type you can change information and properties in the dialog box to create the logical drive.

Depending on the controller type not all input fields are necessarily always displayed.

The dialog box contains two tabs named *Parameters* and *Layout*. First you edit the *Parameters* tab to suit your requirements. Then you switch to the *Layout* tab, edit it, and you can finally use the *Create* button to create the logical drive. If you quit one of the dialog boxes via *Cancel*, no new logical drive is created.

Parameters tab

- In the *RAID type* input field enter the RAID type you wish to create. The default for this field is "RAID−0".
- In the *Name* input field you can take over the default name for the new logical drive or specify a new name. This name must be unique on the controller and may be up to 15 characters long (standard ASCII).

- If a new logical drive requires a stripe size, this is displayed in the field of the same name. You can accept the default (64 Kbyte) or select a different size.

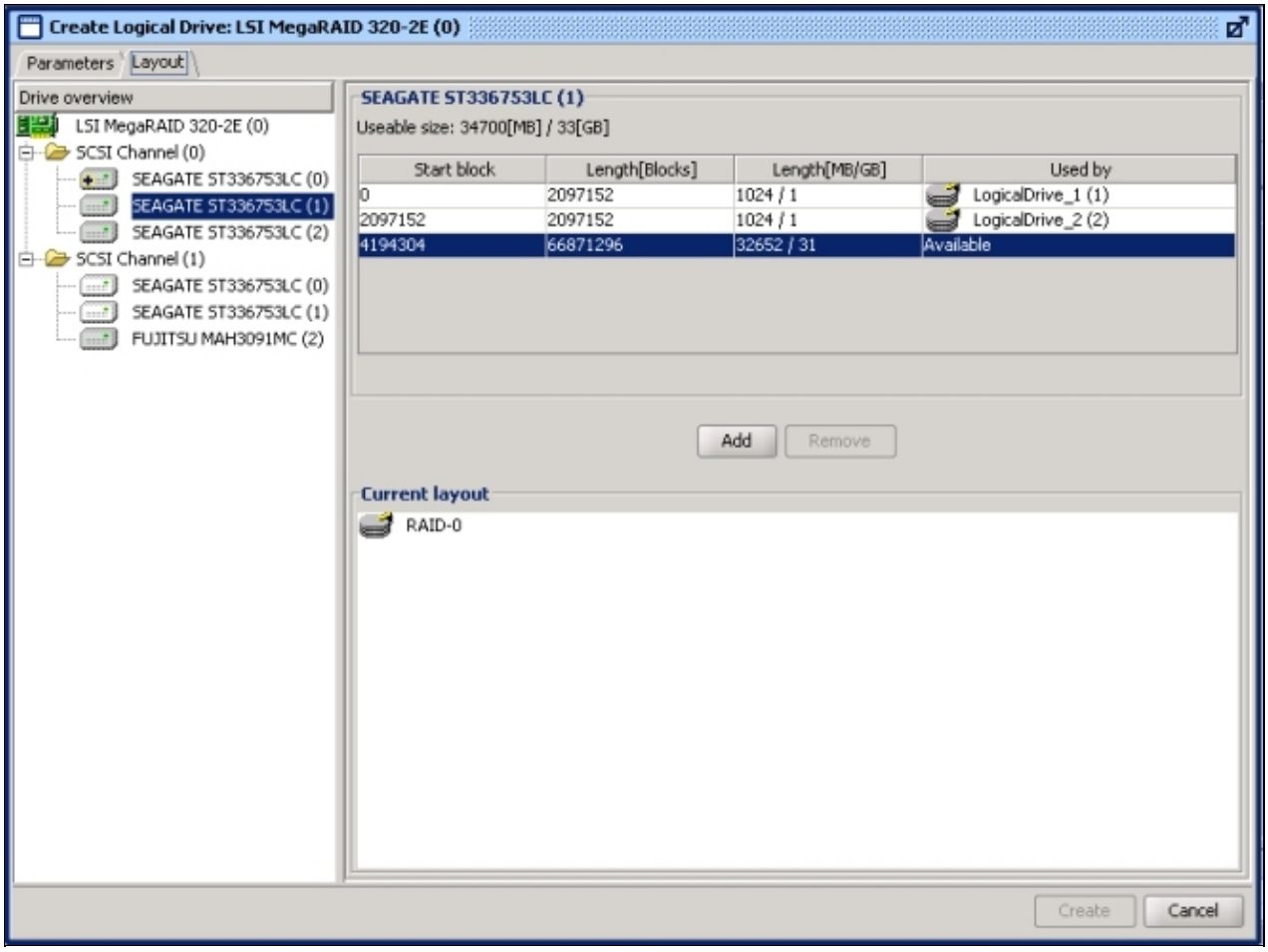
- Under *Capacity of the logical drive* you have two options for determining the size of the logical drive:

    1. *Use maximum capacity* (default)
       The logical drive is created with maximum capacity.

    2. *Use only*
       If you want to use a different value from the default, enable this button and enter the required size in the two adjacent fields.
- Under *General parameters* you can change the defaults for read, write and cache mode.

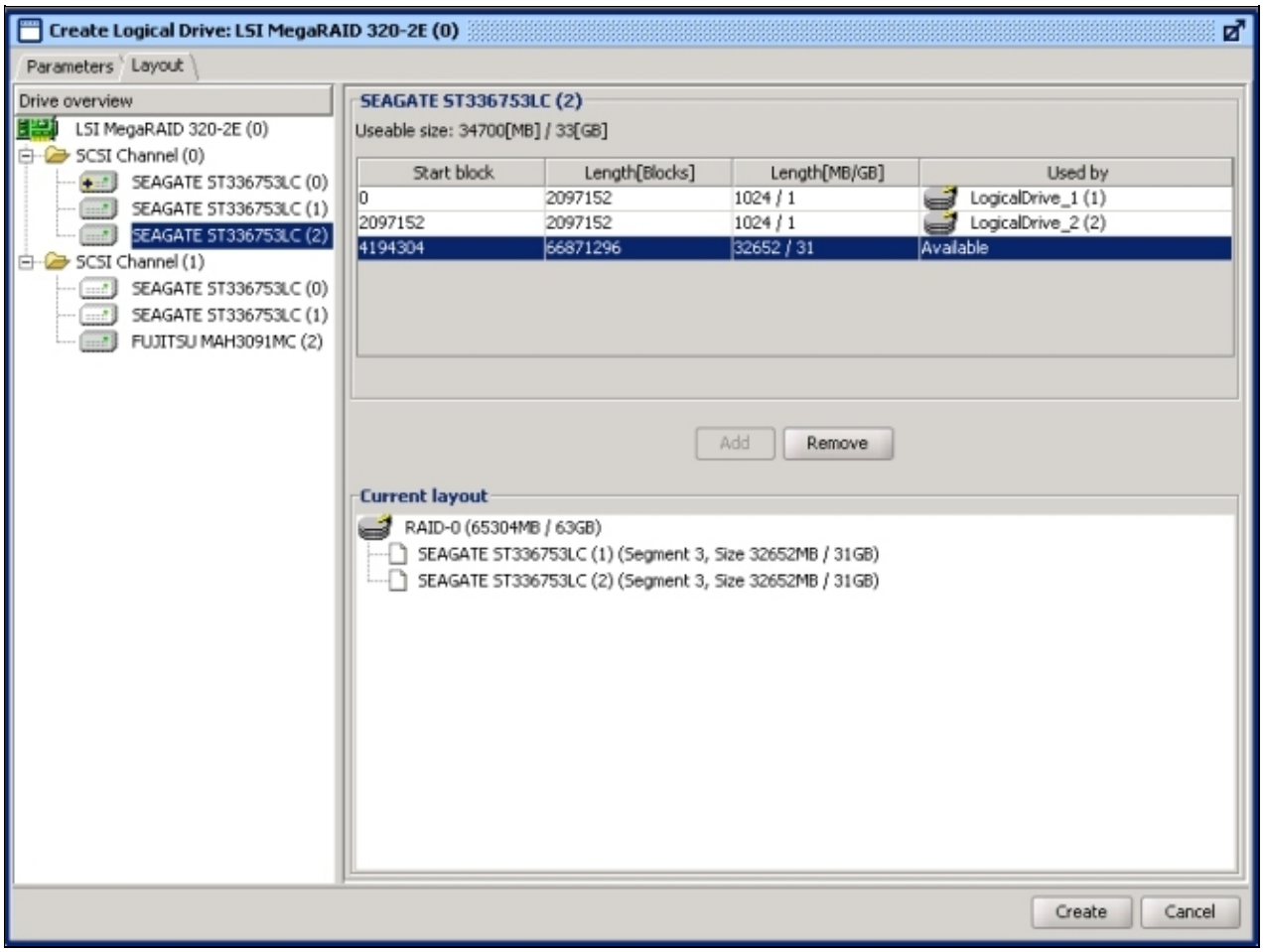
Layout tab

With an LSI controller the *Layout* tab looks, for example, like this:



On the left the tab contains a tree structure in which you select a hard disk or a physical drive and then make it available using the *Add* button. The hard disk that has been added is displayed under *Current layout*.

Logical drives generally (depending on the controller and RAID type) consist of more than just one hard disk. In our example (LSI controller and RAID−0) two hard disks are required. You must therefore select and add a second hard disk. Then you can create the logical drive using the *Create* button:



After you have pressed the *Create* button you must confirm creation of the logical drive again.

4.2 Modifying Logical Drives (migrating)

The *Migrate Logical Drive* action enables you to

- migrate the RAID type to a different type
- expand the capacity of the logical drive

Note: Some operating systems, e.g. Windows XP, Windows 2000 and Windows NT, support Online Capacity Expansion (OCE). OCE means that the additional capacity after a logical drive has been expanded can be used without rebooting the system. Details on the additional storage capacity are provided in the documentation for your operating system.

To make a modification select a logical drive ( ) in the tree structure and start the *Migrate Logical Drive* action (via the pulldown menu of the *Actions* button or with a right mouse click). A dialog box is opened which contains two tabs named *Parameters* and *Layout*.

1. In the *Parameters* tab select the new RAID type in the pulldown menu. The migration options here depend on the RAID controller used.

2. In the *Layout* tab you can if you are offered the option expand the capacity by selecting hard disks in the tree structure and adding them to the logical drive using the *Add* button. You activate your modifications using the *Apply* button.

After you have pressed the *Apply* button you must confirm the modifications again. If you quit one of the dialog boxes using *Cancel* no changes are made.

The following rules apply for modifying a logical drive:

- Select the new RAID type for a migration. If the required type is not supported directly by the controller, you can then only delete the logical drive and create a new one.

- The capacity of the new logical drive must be at least the same as that of the current drive. If the capacity or the RAID type of the new logical drive requires a greater overall drive capacity than the current one, the additional capacity must be provided by the physical drives which are not yet used in this logical drive. In this case please select one or more physical drives which still have sufficient free capacity.

Note: The name of a logical drive can depending on the controller be modified in the properties (*Settings* tab) of the logical drive.

5 Hot Spares

5.1 Managing Hot Spares

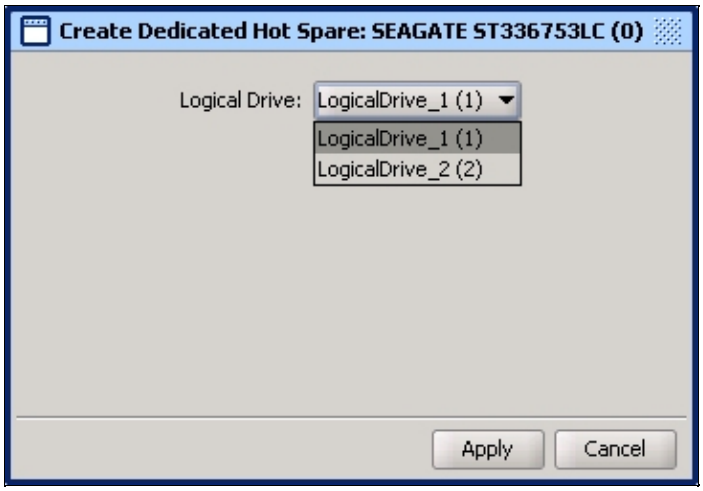
Hot spare drives are used to protect redundant logical drives. If a physical drive in a redundant logical drive backed up by a hot spare fails, the hot spare automatically replaces the failed physical drive.

On some controllers a hot spare can be assigned in order to back up an individual logical drive or all logical drives on the controller. With other controllers it is automatically possible to use any free physical drive which is large enough as a backup.

5.1.1 Creating Hot Spares

With **Hot Spare** you can protect either a single logical drive (dedicated hot spare) or all logical drives on the controller (global hot spare). The example below describes how you create a dedicated hot spare.

- In the tree structure select an unused drive ( ) which is to function as a standby drive.
- Start the *Create Dedicated Hot Spare* action (via the pulldown menu of the *Actions* button or with a right mouse click). A dialog box is opened as in the example below.



In the pulldown menu select the required logical drive and create it using the *Apply* button. After you have pressed the button you must confirm the process once more in another dialog box. The drive that was previously unused is now identified as a dedicated hot spare hard disk ( ) in the tree structure.

Please note that you can only create a hot spare with RAID types **with redundancy** (e.g. RAID−1, RAID−5, **not** RAID−0).

If you quit one of the dialog boxes using *Cancel* no hot spare is created.

5.1.2 Deleting Hot Spares

This action enables you to delete hot spares which you have created. The example below describes how you delete a dedicated hot spare.

- In the tree structure select the dedicated hot spare hard disk ( ) that you want to delete.
- Start the *Delete Dedicated Hot Spare* action (via the pulldown menu of the *Actions* button or with a right mouse click). In the dialog box that appears you must confirm the deletion again.

  After successful deletion the previously dedicated hot spare hard disk is now marked in the tree structure as an unused drive ( ).

6 Properties

6.1 Displaying and Modifying Properties

Depending on the entry marked in the tree structure the following is displayed in the object window under the tab

- *General* − the properties of the object in question which cannot be modified.
- *Settings* − the properties of the object in question which can be modified. Clicking on the *Edit* button opens a dialog box in which you can make changes.

To make them easier to find, the properties within the categories *System*, *Devices* and *ServerView RAID* are listed in alphabetical order independently of the object.

6.1.1 System

- **Operating System**
  - ♦ **Edition**
    Edition of the operating system.
  - ♦ **Processor architecture**
    Processor architecture
  - ♦ **Service pack**
    No. of the Service Pack.
  - ♦ **Vendor**
    Vendor of the operating system.
  - ♦ **Version**
    Version of the operating system.

- **System**
  - ♦ **IP address**
    IP address of the system.
  - ♦ **Name**
    Name of the system.

6.1.2 Devices

- **Adapter**
  - ♦ **Activity**
    Current activity of the RAID controller, e.g. *Patrol Read running*. Additionally for some

activities a progress bar with percents and estimated time remaining will be displayed.

- **Alarm control**
  Some RAID controllers have an audible alarm which is triggered by a wide range of conditions. Here you switch the alarm on or off.

- **Alarm present**
  Displays whether the RAID controller has an audible alarm.

- **Auto flush interval**
  Here you set the intervals at which the cache is to be emptied.

- **Auto inconsistency handling**
  Here you select whether a check is to be started automatically. In the case of redundant systems (e.g. RAID−1, RAID−5, RAID−10) this action starts a check of the logical drive. The consistency check runs in the background, thus enabling you to continue working with the logical drive.

- **Auto rebuild**
  Here you define whether a rebuild is to be started automatically when an error in the logical drive occurs. This setting generally only makes sense in conjunction with a hot spare hard disk.

- **BGI rate**
  Here you set the background initialization rate.

- **BIOS version**
  BIOS version of the controller.

- **Bus**
  Number of the PCI bus to which the controller is connected.

- **Cluster active**
  Active status of the cluster.

- **Cluster enable**
  Here you switch the cluster mode of the controller on or off.

- **Coercion mode**
  Here you select whether the disk size can be artificially rounded up/down by the firmware to facilitate disk exchange.

- **Completed Patrol Read iterations**
  Number of completed Patrol Read runs.

- **Consistency check rate**
  When a logical drive is checked this operation takes place in the background. Here you define the priority with which the consistency check is performed. The higher the priority, the greater the load placed on the system.

- **Correctable error count**
  Number of corrected controller errors.

- **Device**
  Device number on the PCI bus. Together with the bus number this determines the location of the controller.

- **Driver date**
  Creation date of the driver version.

- **Driver version**
  Version of the controller driver.

- **Driver write cache**
  For some controllers which have no hardware cache you can activate a software cache here which is implemented in the driver.

- **Estimated time remaining**
  The estimate of time remaining to complete an activity.

- **Firmware build time**
  Creation date of the firmware version.

- **Firmware package version**
  Firmware package version of the controller; describes firmware, BIOS, etc. as a package.

- **Firmware version**
  Firmware version of the controller.

- **FlashROM size**
  When a RAID controller has a FlashROM its size is shown here.

- **Function**
  Some PCI modules have more than one function, e.g. 2 SCSI Cores (dual−chip as with the new dual−core processors). Together with the location via the PCI bus and PCI device the relevant function can be addressed unambiguously.

- **GB boundary**
  Here you select whether or not values should be rounded down to gigabyte boundaries when logical drives are generated. This setting also allows a slightly smaller drive to be used for replacement.

- **Hard disk write cache**
  Here you activate or deactivate the hard disk write cache of the controller or of all hard disks.

- **Hot spare/auto rebuild**
  Here you define whether new disks are integrated automatically and whether a rebuild is to be started automatically when an error in the logical drive occurs.

- **ID**
  ID of the controller.

- **Inconsistency handling**
  Here you define how the system is to react to controller problems.

- **Inconsistency handling interval**
  Here you set the intervals at which a check is to be started automatically.

- **Init mode**
  Here you select normal or quick initialization for generating the logical drives.

- **Initiator ID**
  Depending on the controller type the initiator ID for all of the controller's channels can be changed here. In cluster mode each device and consequently also the controller and its channel must have a unique ID.

- **Interrupt**
  IRQ number assigned for this controller. In the case of PCI systems this is determined dynamically.

- **Logical**
  Maximum number of logical drives which provides for a configuration to this controller.

- **Max. physical drive count**
  Number of physical drives on which a Patrol Read can be started at the same time.

- **MDC rate**
  Here you set the priority for a consistency check, including debugging (Make Data Consistent).

- **Memory size**
  Size of the memory installed on the controller in Megabytes.

- **Memory type**
  Type of the memory installed on the controller.

- **Migration rate**
  Here you set the migration rate of the connected logical drives.

- **Name**
  Model designation of the controller followed by an unique number. The number is sorted by the PCI location.

- **Number**
  Number of channels/ports of the RAID controller.

- **NVRAM size**
  If an controller has an NVRAM, its size is displayed here.

- **Patrol Read delay**
  For an automatic Patrol Read here you set the time (in hours) which must elapse between two operations.

- **Patrol Read mode**
  Here you can disable a Patrol Read and select manual or automatic mode. In automatic mode the hard disks are always examined for errors at particular intervals. In manual mode you are offered an action for starting the operation.

- **Patrol Read rate**
  Here you set the Patrol Read Rate.

- **Physical**
  Maximum number of physical devices you can connected to this controller.

- **Product**
  Product designation of the controller.

- **Protocol**
  Channel/port protocol of the controller.

- **RAID 5 init**
  Here you select whether or not an automatic initialization for generating RAID 5 drives. It wipes all existing data from the hard disks and sets up parity.

- **Rebuild rate**
  Here you define the priority with which the rebuild is to be performed.

- **S.M.A.R.T. poll interval**
  Here you define the poll interval when S.M.A.R.T. support is enabled.

- **S.M.A.R.T. support**
  Most hard disks provide the option of indicating future problems. Here you enable or disable problem message output.

- **Serial number**
  Serial number of the controller.

- **Spinup delay**
  Here you define how many seconds must elapse before the next cluster of drives is started up.

- **Spinup drive count**
  Number of hard disks which are started up in parallel during a system reboot. The greater the number of drives that start simultaneously, the greater the power consumption.

- **Status**
  Current status of the controller (Ok, Warning, Failed).

- **Task rate**
  Here you define the priority with which the background actions are performed. The higher the priority, the greater the load placed on the system.

- **Temporary offline**
  Some RAID controllers can temporarily switch drives offline (and then online again) without the logical drive being affected.

- **Uncorrectable error count**
  Number of uncorrectable controller errors.

- **Vendor**
  Name of the controller's vendor.

- **BBU**
  - **Current**
    Current flow at present in ampere.

  - **Design capacity**
    Design capacity of the BBU in ampere−hours (Ah).

  - **Design voltage**
    Current voltage of the battery. If the battery is just being charged, higher values may be displayed by the charger.

  - **Manufacture date**
    Date of manufacture of the BBU.

  - **Recalibration active**
    The BBU is completely discharged and then recharged.

  - **Recalibration needed**
    It was recognized that the BBU performance no longer complies with the specifications. Recalibration is to be used to try to make the BBU "fit" again.

  - **Serial number**
    Serial number of the BBU.

  - **Status**
    Current status of the batteries. If the status is no longer normal this means that a bad battery can no longer retain the power it has been charged with and loses voltage too quickly. The battery should be replaced as soon as possible.

  - **Temperature**
    Current temperature of the battery. If this rises significantly above the normal value during charging this indicates a faulty battery.

  - **Type**
    Type designation of the BBU.

  - **Vendor ID**
    ID of the BBU vendor.

  - **Version**
    Version number of the BBU.

- **Channel/Port**
  - **Max. physical devices**
    Maximum number of physical devices that can be connected to the channel/port.
  - **Name**
    Designation of the SCSI channel or port.
  - **SAS address**
    For SAS ports the unique address worldwide like FibreChannel.
  - **Status**
    Here you can enable or disable, i.e. deactivate, the channel.
  - **Termination**
    Termination of the SCSI channel.
  - **Transfer speed**
    Maximum transfer rate which this channel/port theoretically supports.
  - **Transfer width**
    Transfer width of the SCSI channel or port.

- **Hard Disk**
  - **Activity**
    Current activity of the drive, e.g. *consistency check running*. Additionally for some activities a progress bar will be displayed.
  - **Config. size**
    Capacity which the drive provides for a configuration.
  - **Device number**
    Unique drive number on the port.
  - **Estimated time remaining**
    The estimate of time remaining to complete an activity.
  - **Firmware version**
    Firmware version of the drive.
  - **Guarded logical drives**
    List of IDs of the logical drives which are guarded by this physical drive (in its role as dedicated hot spare).
  - **Hardware errors**
    Number of faulty blocks on the hard disk.
  - **Media error count**
    Number of faulty blocks on the hard disk.

- **Misc errors**
  Number of other errors.

- **Name**
  Designation of the drive.

- **Physical size**
  Real capacity of the drive.

- **Product**
  Product designation of the drive.

- **SAS address *nn***
  Unique device address worldwide.

- **Serial number**
  Unique serial number of the drive.

- **Slot**
  Location of the hard disk in the cabinet.

- **S.M.A.R.T. errors**
  Number of errors detected by the S.M.A.R.T. function.

- **S.M.A.R.T. flagged**
  S.M.A.R.T. problem detected.

- **Status**
  Current status of the hard disk (Available, Operational, Global Hot−Spare, Dedicated Hot−Spare, Failed).

- **Target ID**
  Unique drive number on the channel. With SCSI devices this is also the SCSI ID.

- **Transfer speed**
  Data transfer speed. This can deviate from the theoretical values for the drive or the options for the controller since, for example in the case of SCSI devices, the transfer rate between the controller and all devices is negotiated.

- **Transfer width**
  Data width; depends, among other things, on the bus type and drive.

- **Type**
  Hard disk type.

- **Vendor**
  Name of the vendor.

- **Logical Drive**

- **Access mode**
  Here you set the access mode which can be used to access the logical drive.

- **Activity**
  Current activity of the logical drive, e.g. *consistency check running*. Additionally for some activities a progress bar will be displayed.

- **BGI**
  Here you enable or disable the background initialization rate.

- **Cache mode**
  Here you select whether read and write operations are forwarded directly or buffered in the cache.

- **Default cache mode**
  Here you select the default value for cache mode.

- **Default read mode**
  Here you select the default value for read mode.

- **Default write mode**
  Here you select the default value for write mode.

- **Disk cache mode**
  Status of the disk cache mode.

- **Drive number**
  Number of the logical drive.

- **Estimated time remaining**
  The estimate of time remaining to complete an activity.

- **Initialization status**
  Initialization status of the logical drive.

- **Logical size**
  Net capacity of the logical drive. In contrast to the drive vendors the size shown here is that actually available for the operating system.

- **Name**
  Name assigned when the logical drive was created.

- **Physical size**
  Sum total of the storage space used on the physical drives.

- **RAID level**
  RAID level of the logical drive.

- **Read mode**
  Here you define the read mode. The following settings are available:

Read−ahead	Advance read access to the memory takes place.
No read−ahead	No advance read access to the memory takes place.
Adaptive	When most of the last read accesses to successive sectors have taken place the controller switches to *Read−ahead*. When the read accesses have been distributed it switches back to *No read−ahead*.

♦ **Status**
Current status of the logical drive (Operational, Degraded, Failed).

♦ **Stripe size**
In the case of logical drives with striping (RAID types 0, 5, 10 and 50) the data is distributed to the associated hard disks in equally sized sections. The amount of data in each section is the stripe size.

♦ **Type**
RAID type of the logical drive.

♦ **Write mode**
Here you define the write mode. The following settings are available:

Write−back	The controller sends a signal to the server when the data has been written to the controller's cache.
Write−through	The controller sends a signal to the server only when the data has been written to the drive.
Adaptive	When this setting is chosen and a charged battery is connected the same procedure is followed as described under *Write−back*, otherwise the controller behaves as for *Write−through*.
Adaptive write−back	This display appears when *Adaptive* is selected and the controller currently handles the write requests as described under *Write−back*. After a battery failure the controller automatically switches to *Write−through*.
Adaptive write−through	This display appears when *Adaptive* is selected and the controller currently handles the write requests as described under *Write−through*. When a charged battery is available again the controller automatically switches back to *Write−back*.

• **Processor**

♦ **Firmware version**
Firmware version of the processor.

♦ **Name**
Model designation of the processor.

♦ **Product**
Product designation of the processor.

♦ **Status**
Current status of the processor, fan, power supply, or temperature sensor.

- **Target ID**
  Unique drive number on the channel.

- **Temperature**
  Temperature display.

- **Type**
  Type designation of the processor.

- **Vendor**
  Name of the vendor.

6.1.3 ServerView RAID

- **File Event Logging**
  - **File name**
    Here you can modify the name of the save file for file events which is used by ServerView RAID.

  - **File size**
    You can modify the size of the save file for file events in steps of one Mbyte. Ten Mbytes is preset.

  - **Logging**
    By default file events are written to a ServerView RAID log file. You can disable this logging here.

  - **Log level**
    File events are weighted differently. This option enables you to set a threshold from which the events are logged.

  - **Log method**
    By default a full save file for file events is assigned a new name and saved so that logging can continue in an empty file (Rotation method). If you wish you can also choose the Round Robin method. In this case the oldest entries in the full file are overwritten.

  - **Max. save files**
    Here you can restrict the maximum number of save files for file events that are retained when the Rotation method is used. If the upper limit is exceeded the oldest file is deleted.

- **Multiplexer**
  - **Poll interval**
    Here you can define the intervals at which ServerView RAID queries the multiplexer (default: 3 seconds).

  - **Status**
    Status of the multiplexer.

- **Plug−in**
  - **Name**
    Name of the plug−in.

  - **Poll interval**
    Here you can define the intervals at which the plug−in queries the controller for changes (default: 2 seconds).

  - **Vendor**
    Name of the vendor.

  - **Version**
    Version of the plug−in or API.

- **System Event Logging**
  - **Logging**
    By default system events are written to a system file. You can disable this logging here. Depending on the operating system used you can have the event log displayed and manage it with the corresponding functions. Further information on this is provided in the help system for the operating system.

  - **Log level**
    System events are weighted differently. With this option you set a threshold from which the events are logged.

7 Actions

7.1 Executing Actions

Depending on the controller, channel and physical or logical drive selected different actions can be executed via menu item *Actions*. The hardware type is also decisive for the functionality offered. For example, "Patrol Read" is not supported by all controllers and is consequently not always offered.

The actions which you can execute with the RAID Manager for particular objects are arranged alphabetically to permit easy reference. The associated description tells you which object (controller, drive, etc.) they can be used for.

Please note that some actions are not possible with all controller types.

- **Alarm off**
  The controller's alarm test is terminated and the alarm signal is deactivated.

- **Alarm on**
  An alarm signal is activated for checking the controller.

- **Cancel BGI**
  Cancels initialization which was automatically started by an LSI controller at low priority in the background.

- **Cancel consistency check**
  The consistency check is aborted.

- **Cancel initialization**
  Initialization of the logical drive is aborted.

- **Cancel Patrol Read**
  The Patrol Read process is aborted.

- **Cancel rebuild**
  The Rebuild process is aborted.

- **Cancel verification**
  Aborts checking of the hard disk.

- **Clear bad block log**
  The log of defective blocks is deleted.

- **Clear configuration**
  The entire configuration (all logical drives, hot spare disks, etc.) is deleted.

- **Clear foreign configuration**
  This action deletes the foreign configuration of all physical drives which the firmware has recognized as belonging together.

- **Clear log**
  The drive's error log is deleted.

- **Clear NVRAM log**
  The log from the controller's NVRAM is deleted.

- **Continue consistency check**
  The consistency check is resumed at the place where it was previously stopped.

- **Continue initialization**
  The interrupted initialization of the logical drive is resumed.

- **Continue migration**
  Migration of a logical drive is resumed (see Migrate Logical Drive).

- **Continue Patrol Read**
  The Patrol Read process is resumed at the point where it was previously stopped.

- **Continue rebuild**
  The Rebuild process is resumed at the point where it was previously stopped.

- **Create dedicated hot spare**
  Creates a so−called hot spare hard disk. When another disk fails the hot spare disk is automatically integrated into ongoing operations in place of the defective disk. This permits the data of the defective hard disk to be restored. A dedicated hot spare hard disk protects only a *selection* of all redundant logical drives.

- **Create global hot spare**
  Creates a so−called hot spare hard disk. When another disk fails the hot spare disk is automatically integrated into ongoing operations in place of the defective disk. This permits the data of the defective hard disk to be restored. In contrast to a dedicated hot spare hard disk a global hot spare hard disk protects *all* redundant logical drives.

- **Create logical drive**
  Parts of one or more physical drives are combined to form a logical ("virtual") drive.

- **Create RAID volume**
  Two logical drives of the same type (RAID level) are combined to form a logical drive.

- **Delete all logical drives**
  All existing logical drives are deleted.

- **Delete dedicated hot spare**
  Deletes a dedicated hot spare hard disk.

- **Delete global hot spare**
  Deletes a global hot spare hard disk.

- **Delete last logical drive**
  The logical drive created last (i.e. the logical drive with the highest index number) is deleted.
  Warning: It is also deleted if you are currently working on it.

- **Delete logical drive**
  A logical drive is deleted. **Note:** This action is **not** offered for an LSI controller. With this type you can only delete either all logical drives at once or just the last one.

- **Discharge**
  Discharges the battery for the emergency power supply (Battery Backup Unit BBU).

- **Display bad block log**
  The defective drive device blocks which the controller found when checking the devices are displayed.

- **Fast charge**
  The battery for the emergency power supply (Battery Backup Unit BBU) is charged rapidly.

- **Flush memory**
  The data from the controller's cache (internal memory) is written to the hard disks. The cache is then empty.

- **Force write access**
  Forces write access when another user either does not want to or cannot transfer it. **Caution:** This action should only be performed after you have thoroughly weighed up the pros and cons.

- **Format device**
  A disk drive is formatted. **Warning:** All data previously stored on the drive is lost. If the hard disk drive is used in a logical drive the data integrity of the logical drive is also impaired.

- **Get write access**
  Takes over write access from another user.

- **Import foreign configuration**
  This action is used to import the foreign configuration of all physical drives which the firmware has recognized as belonging together. After this action has been executed, the logical drives which were built with these disks are available for further processing.

- **Locate device**
  A physical disk drive is located. An LED on the disk drive flashes either briefly or until drive location is aborted. In the case of some controllers the LED is set to remain constantly bright.

- **Locate logical drive**
  A logical drive is located.

- **Make offline**
  A drive is switched "offline" and is removed from the configuration. The status of the logical drive concerned changes to "failed/missing".

- **Make online**
  A drive is placed back in service.

- **Make ready**
  A hard disk which was switched "offline" and is no longer part of a logical drive can no longer be switched "online" but only be made available. Only then can it be included in the configuration again

using the Make Online action.

- **Migrate logical drive**
  A logical drive is transferred directly from one RAID type to another.

- **Pause consistency check**
  The consistency check is stopped. This can, for example, be necessary when more throughput capacity needs to be provided at short notice for the logical drives connected to the controller.

- **Pause initialization**
  Initialization of the logical drive is interrupted.

- **Pause migration**
  Migration of a logical drive is stopped (see Migrate Logical Drive).

- **Pause Patrol Read**
  The Patrol Read process is stopped. This can, for example, be necessary when more throughput capacity needs to be provided at short notice.

- **Pause rebuild**
  The Rebuild process is stopped. This can, for example, be necessary when more throughput capacity needs to be provided at short notice for the logical drives connected to the controller.

- **Recalibration**
  The battery for the emergency power supply (Battery Backup Unit BBU) is recalibrated. This action returns the battery to its ideal condition.

- **Release write access**
  Releases write access for another user who urgently needs it.

- **Replace missing physical drive**
  With this action a free disk takes over the tasks of a failed disk.
  If a hard disk in a logical drive fails in the new LSI, SAS/SATA solutions and if this is replaced by a new disk, the latter does not automatically take the place of the disk that has been replaced but must be activated manually. If the logical drive should continue to offer restricted functionality after this action has been completed successfully, the rebuild must be started manually.

- **Reset error counters**
  This action automatically deletes the error event log for the disk drive and the error counter is set to zero.

- **Scan configuration**
  All the information collected internally is deleted and then all the data is read in anew.

- **Show failure log**
  The disk drive errors recorded are displayed. Since some of these errors may have been rectified in the meantime (e.g. by replacing a drive) the log cannot be interpreted as the current status.

- **Show NVRAM log**
  The internal log from the controller's NVRAM (non−volatile memory) is displayed. This information is generally required by engineers for maintenance purposes.

- **Show sense log**
  A table with the last *n* SCSI items of sense information which occurred are displayed. SCSI sense information is generally present when a SCSI command has failed and the controller or the disk can supply additional information on why this happened.

- **Start consistency check**
  In the case of redundant systems (e.g. RAID−1, RAID−5, RAID−10) this action starts a check of the logical drive. The consistency check runs in the background, thus enabling you to continue working with the logical drive. Depending on how the synchronization procedure has been set on the controller any error that is found is skipped or rectified if possible, or the consistency check is stopped and an error message is displayed.
  Note: With some controllers the priority of this process can be changed via the *Settings* tab. The following rule applies here: The lower the priority, the longer the process, but this enables you to work better.

- **Start device**
  A disk drive is started, i.e. the disk drive is brought up to its standard speed. With some high−speed disks this can take some time. As power consumption is higher when the disks start up not all of them should be started up at once.

- **Start initialization**
  A logical drive is initialized. Before you write the first user data to a logical drive you should initialize this drive.
  Note: Some controllers automatically perform initialization when the logical drive is created. This action is not offered for these drives.
  Warning: Initialization destroys all user data on the logical drive.

- **Start MDC**
  A consistency check takes place and, if it is possible to rectify any inconsistency which is found, this is done automatically (Make Data Consistent).

- **Start Patrol Read**
  A Patrol Read process is started on a hard disk drive. In this case restricted access is still possible to the drive. Patrol Read examines the drive's interface for errors. If an error is detected which cannot be rectified automatically, this error is logged. The faulty part of the medium is assigned to the defective blocks. With some controllers the hard disk is automatically taken out of service if multiple errors are found.
  This error check is not supported by every controller, but some controllers provide the option of performing a check automatically at freely selectable intervals.

- **Start rebuild**
  In the case of critical logical drives of the type RAID−1, RAID−5 or RAID−10 this action starts rebuilding the logical drive. Generally the failed physical drive is automatically replaced by a hot spare drive and a rebuild is subsequently started automatically provided this is set on the controller. The action runs in the background, and as long as no further physical drive fails it is still possible to work with the logical drive.
  Note: With some controllers the priority of this process can be changed via the *Settings* tab. The following rule applies here: The lower the priority, the longer the process, but this enables you to work better.

- **Start verification**
  Starts a hard disk check.

- **Stop charge**
  Terminates the battery charging process for the emergency power supply (Battery Backup Unit BBU).

- **Stop device**
  A disk drive is stopped. This action can sometimes make sense before a device is replaced.

- **Stop location**
  Drive location is stopped and the LED is switched off.

8 Events

8.1 Displaying Events

The event window is located at the lower edge of the user interface. It contains the latest events of all the RAID controllers which are managed by ServerView RAID. You can use the delimiter bar to enlarge or reduce this window.

The following information is available for each event:

- At the far left the type of event is presented by an icon which indicates the severity.

  Error
  Warning
  Important Information

- Date and time at which the event occurred
- The name of the object which reported the event
- Event ID
- A brief message with a description of the event

ServerView RAID logs all events and places these logs in a Log file in plain text. This file is in XML format and is simple to read out and process.

In addition, all problems are reported to the system's own alarm manager, which is installed from ServerView. Please refer to the ServerView help for further details and configuration options.

Note that the message texts, IDs and error classes of the events are the same as those used in the **traps** and in file/system logging. The only difference is that the four error classes of the traps have been reduced to three error classes for the events (Informational = Information, Critical = Error, Major and Minor = Warning).

8.2 SNMP Traps

The basis for the SNMP agent of ServerView RAID is the MIB file RAID.mib. All the information and trap types are defined in this file. The traps of RAID.mib are listed below.

Note that the message texts, IDs and error classes of the traps are the same as those used in the **event messages** in the interface and in file/system logging.

Trap name	ID	Meaning	Error class
svrTrapUndefinedEvent	1	Undefined Event	Informational
svrTrapUnknownEvent	10000	Unknown event	Informational
svrTrapInternalEvent	10001	Internal event	Informational

svrTrapWriteAccessRevoked	10002	Write access to ServerView RAID revoked by user [..] ([..])	Minor
svrTrapBatteryTempOutOfRange	10003	BBU temperature out of range	Major
svrTrapBatteryTempUnstable	10004	BBU temperature unstable	Major
svrTrapBatteryTempAboveTheshold	10005	BBU temperature above threshold	Major
svrTrapBatteryVoltageOutOfRange	10006	BBU voltage out of range	Major
svrTrapBatteryVoltageUnstable	10007	BBU voltage unstable	Major
svrTrapBatteryVoltageLow	10008	BBU voltage below threshold	Major
svrTrapBatteryCommunicationError	10009	BBU communication error	Major
svrTrapBatteryReconditionStarted	10010	BBU reconditioning started	Informational
svrTrapBatteryStatusNormal	10011	BBU status becomes normal	Informational
svrTrapBatteryGood	10012	BBU good	Informational
svrTrapBatteryFailed	10013	BBU failed	Critical
svrTrapBatteryFastChargingFailed	10014	BBU fast charging failed	Major
svrTrapBatteryChargeCountExceeded	10015	BBU charge count exceeded	Minor
svrTrapBatteryNeedsRecondition	10016	BBU needs reconditioning	Minor
svrTrapSCSISenseAvailable	10017	SCSI sense data on physical disk ([..]) available: [..]	Informational
svrTrapAsyncCommandCompleted	10018	Asynchronous command completed	Informational
svrTrapAdapterPaused	10019	Adapter [..] paused	Informational
svrTrapAdapterContinued	10020	Adapter [..] continued	Informational
svrTrapPDMarkedOnline	10021	Physical disk ([..]) marked online	Informational
svrTrapPDMarkedOffline	10022	Physical disk ([..]) marked offline	Critical
svrTrapPDTimedOut	10023	Physical disk ([..]) timed out	Major
svrTrapPDCreatedGlobalHotspare	10024	Global hot spare created on physical disk ([..])	Informational
svrTrapPDDeletedGlobalHotspare	10025	Global hot spare deleted on physical disk ([..])	Minor
svrTrapPDCreatedDedicatedHotspare	10026	Dedicated hot spare created on physical disk ([..])	Informational
svrTrapPDDeletedDedicatedHotspare	10027	Dedicated hot spare deleted on physical disk ([..])	Minor
svrTrapPDMarkedAvailable	10028	Physical disk ([..]) marked available	Informational
svrTrapPDRebuildStarted	10029	Rebuild on physical disk ([..]) started	Informational

svrTrapPDRebuildFailed	10030	Rebuild on physical disk ([..]) failed	Major
svrTrapPDBadBlockDetected	10031	Bad block on physical disk ([..]) LBA [..] detected	Major
svrTrapNewPDDetected	10032	New physical disk ([..]) detected	Informational
svrTrapPDRemoved	10033	Physical disk ([..]) removed	Minor
svrTrapPDBadSectorLogEntryCleared	10034	Bad sector log entry on physical disk ([..]) cleared	Informational
svrTrapPDBadSectorLogUpdated	10035	Bad sector log on physical disk ([..]) updated	Informational
svrTrapPDBadSectorDetected	10036	Bad sector on physical disk ([..]) detected	Major
svrTrapPDCODIOError	10037	COD I/O error on physical disk ([..])	Major
svrTrapPDErrorDetected	10038	Error on physical disk ([..]) detected	Major
svrTrapChannelReset	10039	Channel [..] was reset	Informational
svrTrapPDRetryIO	10040	Retry I/O on physical disk ([..])	Major
svrTrapPDECCError	10041	ECC Error on physical disk ([..])	Major
svrTrapAdapterWriteModeChanged	10042	Write modes changed	Informational
svrTrapPDMediaError	10043	Media error on physical disk ([..])	Major
svrTrapPDSMARTWarning	10044	S.M.A.R.T. warning on physical disk ([..])	Minor
svrTrapPDSMARTError	10045	S.M.A.R.T. error on physical disk ([..])	Minor
svrTrapEnclosureBadPDInserted	10046	Bad physical disk inserted in enclosure [..]	Major
svrTrapEnclosurePoweredDown	10047	Enclosure [..] powered down	Major
svrTrapEnclosurePoweredUp	10048	Enclosure [..] powered up	Informational
svrTrapEnclosureFanFailed	10049	Fan [..] in enclosure [..] failed	Critical
svrTrapEnclosureTempSensAboveThreshold	10050	Temperature sensor [..] in enclosure [..] above threshold	Major
svrTrapEnclosurePowerSupplyFailed	10051	Power supply [..] in enclosure [..] failed	Critical
svrTrapPD33VPowerFailed	10052	3.3V power failed for physical drive ([..])	Critical
svrTrapPD50VPowerFailed	10053	5.0V power failed for physical drive ([..])	Critical
svrTrapPD12VPowerFailed	10054		Critical

		12V power failed for physical drive ([..])	
svrTrapLDRebuildStarted	10055	Rebuild started on logical drive [..]	Informational
svrTrapLDRebuildFinished	10056	Rebuild finished on logical drive [..]	Informational
svrTrapLDRebuildFailed	10057	Rebuild failed on logical drive [..]	Major
svrTrapLDRebuildAborted	10058	Rebuild aborted on logical drive [..]	Minor
svrTrapLDRebuildPaused	10059	Rebuild paused on logical drive [..]	Informational
svrTrapLDConCheckStarted	10060	Consistency check started on logical drive [..]	Informational
svrTrapLDConCheckFinished	10061	Consistency check finished on logical drive [..]	Informational
svrTrapLDConCheckFailed	10062	Consistency check failed on logical drive [..]	Major
svrTrapLDConCheckAborted	10063	Consistency check aborted on logical drive [..]	Minor
svrTrapLDConCheckPaused	10064	Consistency check paused on logical drive [..]	Informational
svrTrapLDUninitialisedConCheckStarted	10065	Consistency check started on uninitialized logical drive [..]	Informational
svrTrapLDConCheckFinishedWithErrors	10066	Consistency check finished with errors on logical drive [..]	Major
svrTrapLDInconsistencyDetected	10067	Inconsistency detected on logical drive [..] at LBA [..]	Major
svrTrapLDMigrationStarted	10068	Migration started on logical drive [..]	Informational
svrTrapLDMigrationFinished	10069	Migration finished on logical drive [..]	Informational
svrTrapLDMigrationFailed	10070	Migration failed on logical drive [..]	Major
svrTrapLDMigrationAborted	10071	Migration aborted on logical drive [..]	Minor
svrTrapAdapterPatrolReadStarted	10072	Patrol Read started	Informational
svrTrapAdapterPatrolReadCompleted	10073	Patrol Read completed	Informational
svrTrapAdapterPatrolReadAborted	10074	Patrol Read aborted	Minor
svrTrapAdapterPatrolReadStopped	10075	Patrol Read stopped	Informational
svrTrapAdapterPatrolReadPaused	10076	Patrol Read paused	Informational
svrTrapAdapterPatrolReadContinued	10077	Patrol Read continued	Informational

svrTrapLDDegraded	10078	Logical drive [..] degraded	Major
svrTrapLDFailed	10079	Logical drive [..] failed	Critical
svrTrapLDCreated	10080	Logical drive [..] created	Informational
svrTrapLDDeleted	10081	Logical drive [..] deleted	Minor
svrTrapLDOperational	10082	Logical drive [..] operational	Informational
svrTrapLDPDError	10083	Logical drive [..]: Error on physical disk [..]	Major
svrTrapLDBadBlockDetected	10084	Logical drive [..]: Bad block at LBA [..] detected	Major
svrTrapLDInitStarted	10085	Initialization started on logical drive [..]	Informational
svrTrapLDInitFinished	10086	Initialization finished on logical drive [..]	Informational
svrTrapLDBackInitStarted	10087	BGI started on logical drive [..]	Informational
svrTrapLDBackInitFinished	10088	BGI finished on logical drive [..]	Informational
svrTrapLDBackInitCanceled	10089	BGI canceled on logical drive [..]	Minor
svrTrapLDInitCanceled	10090	Initialization canceled on logical drive [..]	Minor
svrTrapLDDriveLetterChanged	10091	Drive letter changed for logical drive [..]	Informational
svrTrapLDHotspareOperationStarted	10092	Hot spare operation on logical drive [..] started	Informational
svrTrapLDHotspareOperationFailed	10093	Hot spare operation on logical drive [..] failed	Major
svrTrapLDForcedFromFailedToDegraded	10094	Logical drive [..] forced from failed to degraded	Major
svrTrapAdapterAlarmEnabled	10095	Alarm enabled	Informational
svrTrapAdapterAlarmDisabled	10096	Alarm disabled	Minor
svrTrapAdapterAutomaticCheckEnabled	10097	Automatic inconsistency handling enabled	Informational
svrTrapAdapterAutomaticCheckDisabled	10098	Automatic inconsistency handling disabled	Informational
svrTrapAdapterCheckIntervalChanged	10099	Inconsistency handling interval changed	Informational
svrTrapAdapterRebuildRateChanged	10100	Rebuild rate changed	Informational
svrTrapAdapterPatrolReadDisabled	10101	Patrol Read disabled	Informational
svrTrapAdapterPatrolReadAutomatic	10102	Patrol Read set to automatic	Informational
svrTrapAdapterPatrolReadManual	10103	Patrol Read set to manual	Informational
svrTrapAdapterPatrolReadDelayChanged	10104	Patrol Read delay changed	Informational

svrTrapAdapterInitNormal	10105	Initialization set to normal	Informational
svrTrapAdapterInitFast	10106	Initialization set to fast	Informational
svrTrapAdapterInitiatorIDChanged	10107	Initiator ID changed	Informational
svrTrapAdapterAutomaticeRebuildEnabled	10108	Automatic rebuild enabled	Informational
svrTrapAdapterAutomaticeRebuildDisabled	10109	Automatic rebuild disabled	Informational
svrTrapAdapterNewDeviceAutomatic	10110	New device set to automatic	Informational
svrTrapAdapterNewDeviceCTRLM	10111	New device set to CtrlM	Informational
svrTrapAdapterMDCRateChanged	10112	MDC rate changed	Informational
svrTrapAdapterMDCRateChangedEx	10113	MDC rate changed to [..]%	Informational
svrTrapAdapterBIOSEnabled	10114	BIOS enabled	Informational
svrTrapAdapterBIOSDisabled	10115	BIOS disabled	Informational
svrTrapAdapterStopOnErrorEnabled	10116	Stop on error enabled	Informational
svrTrapAdapterStopOnErrorDisabled	10117	Stop on error disabled	Informational
svrTrapAdapterPDWriteCacheEnabled	10118	Write cache on all physical disks enabled	Informational
svrTrapAdapterPDWriteCacheDisabled	10119	Write cache on all physical disks disabled	Informational
svrTrapAdapterPDReadAheadEnabled	10120	Read−ahead on all physical disks enabled	Informational
svrTrapAdapterPDReadAheadDisabled	10121	Read−ahead on all physical disks disabled	Informational
svrTrapAdapterAutomaticResumeEnabled	10122	Automatic resumption enabled	Informational
svrTrapAdapterAutomaticResumeDisabled	10123	Automatic resumption disabled	Informational
svrTrapAdapterDevicesPerSpinChanged	10124	Spinup drive count changed (after next reboot)	Informational
svrTrapAdapterDelayBetweenSpinsChanged	10125	Spinup delay changed (after next reboot)	Informational
svrTrapAdapterConCheckRateChanged	10126	Consistency check rate changed	Informational
svrTrapAdapterTempOfflineEnabled	10127	Temporary offline enabled	Informational
svrTrapAdapterTempOfflineDisabled	10128	Temporary offline disabled	Informational
svrTrapAdapterSMARTEnabled	10129	S.M.A.R.T. enabled	Informational
svrTrapAdapterSMARTDisabled	10130	S.M.A.R.T. disabled	Informational
svrTrapAdapterSMARTPollIntervalChanged	10131	S.M.A.R.T. poll interval changed	Informational
svrTrapAdapterConfigChanged	10132	Configuration rescanned	Informational
svrTrapAdapterConfigCleared	10133	Configuration cleared	Informational
svrTrapAdapterActivityChanged	10134	Activity changed	Informational
svrTrapChannelTerminationWide	10135		Informational

		Channel [..] termination set to wide	
svrTrapChannelTerminationNarrow	10136	Channel [..] termination set to narrow	Informational
svrTrapChannelTerminationDisabled	10137	Channel [..] termination disabled	Informational
svrTrapChannelActivated	10138	Channel [..] activated	Informational
svrTrapChannelDisabled	10139	Channel [..] disabled	Minor
svrTrapChannelDedicated	10140	Channel [..] set to dedicated	Informational
svrTrapChannelShared	10141	Channel [..] set to shared	Informational
svrTrapLDReadAheadEnabled	10142	Logical drive [..]: Read−ahead enabled	Informational
svrTrapLDReadAheadDisabled	10143	Logical drive [..]: Read−ahead disabled	Informational
svrTrapLDAdaptiveReadAheadEnabled	10144	Logical drive [..]: Adaptive read−ahead enabled	Informational
svrTrapLDWriteModeWriteThrough	10145	Logical drive [..]: Write mode set to Write−through	Informational
svrTrapLDWriteModeWriteBack	10146	Logical drive [..]: Write mode set to Write−back	Informational
svrTrapLSIOModeDirect	10147	Logical drive [..]: I/O mode set to direct	Informational
svrTrapLSIOModeCached	10148	Logical drive [..]: I/O mode set to cached	Informational
svrTrapPDTransferSpeedChanged	10149	Max. transfer speed of physical disk ([..]) changed (after next reboot)	Informational
svrTrapPDBusWidthChanged	10150	Bus width of physical disk ([..]) changed (after next reboot)	Informational
svrTrapBBUVoltageProblemDetected	10151	BBU voltage problem detected	Major
svrTrapBBUTempProblemDetected	10152	BBU temperature problem detected	Major
svrTrapBBUCharging	10153	BBU charging	Informational
svrTrapBBUFailed	10154	BBU failed	Critical
svrTrapBBUNormal	10155	BBU normal	Informational
svrTrapBBUDischarging	10156	BBU discharging	Informational
svrTrapAdapterDiskErrorFixed	10157	Disk error fixed	Minor
svrTrapAdapterDriverWriteCacheEnabled	10158	Driver write cache enabled	Informational
svrTrapAdapterDriverWriteCacheDisabled	10159	Driver write cache disabled	Informational
svrTrapAdapterDriveSizingEnabled	10160	Drive sizing (GB boundary)	Informational

		enabled	
svrTrapAdapterDriveSizingDisabled	10161	Drive sizing (GB boundary) disabled	Informational
svrTrapAdapterHotspareAndAutomaticRebuildEnabled	10162	Hot spare support and automatic rebuild enabled	Informational
svrTrapAdapterHotspareAndAutomaticRebuildDisabled	10163	Hot spare support and automatic rebuild disabled	Informational
svrTrapAdapterTaskRateChanged	10164	Task rate changed	Informational
svrTrapAdapterInonHandlingCheck	10165	Inconsistency handling set to consistency check	Informational
svrTrapAdapterInonHandlingCheckAbort	10166	Inconsistency handling set to consistency check (abort on first inconsistency)	Informational
svrTrapAdapterInonHandlingMDC	10167	Inconsistency handling set to MDC	Informational
svrTrapLDNameChanged	10168	Logical drive [..]: Name changed	Informational
svrTrapLDCacheWriteModeChanged	10169	Logical drive [..]: Cache write mode changed	Informational
svrTrapRebootRequired	10170	Reboot required	Major
svrTrapModuleLoggedIn	10171	User [..] ([..]) logged in	Informational
svrTrapModuleLoggedOut	10172	User [..] ([..]) logged out	Informational
svrTrapAdapterHotspareEnabled	10173	Hot spare enabled	Informational
svrTrapAdapterHotspareDisabled	10174	Hot spare disabled	Informational
svrTrapAdapterHotswapEnabled	10175	Hot swap enabled	Informational
svrTrapAdapterHotswapDisabled	10176	Hot swap disabled	Informational
svrTrapAdapterWriteModeWriteBack	10177	Write mode set to Write−back	Informational
svrTrapAdapterWriteModeWriteThrough	10178	Write mode set to Write−through	Informational
svrTrapAdapterWriteModeAdaptive	10179	Write mode set to Adaptive	Informational
svrTrapBatteryChargeStarted	10180	BBU charging started	Informational
svrTrapAdapterAutomaticRAID5InitEnabled	10181	Automatic initialization of RAID−5 enabled	Informational
svrTrapAdapterAutomaticRAID5InitDisabled	10182	Automatic initialization of RAID−5 disabled	Informational
svrTrapAdapterCopyBackEnabled	10183	Copy−back enabled	Informational
svrTrapAdapterCopyBackDisabled	10184	Copy−back disabled	Informational
svrTrapAdapterInitClear	10185	Initialization set to clear	Informational
svrTrapPDVerifyStarted	10186	Verification started on physical drive ([..])	Informational
svrTrapPDVerifyFinished	10187		Informational

		Verification finished on physical drive ([..])	
svrTrapLDReadModeChanged	10188	Logical drive [..]: Cache read mode changed	Informational
svrTrapLDCacheModeChanged	10189	Logical drive [..]: Cache mode changed	Informational
svrTrapLDAcessModeChanged	10190	Logical drive [..]: Access mode changed	Informational
svrTrapLDBGIModeChanged	10191	Logical drive [..]: BGI mode changed	Informational
svrTrapLDDiskCacheModeChanged	10192	Logical drive [..]: Disk cache mode changed	Informational
svrTrapBoot	10193	Firmware initialization started	Informational
svrTrapVersion	10194	Firmware version [..]	Informational
svrTrapBBUTBBUDirtyCacheConfigMismatch	10195	Unable to recover cache data from TBBU	Major
svrTrapBBUTBBUDirtyCacheProcessed	10196	Cache data recovered from TBBU successfully	Informational
svrTrapClustDown	10197	Cluster down; communication with peer lost	Major
svrTrapClustOwnershipChanged	10198	[..] ownership changed from [..] to [..]	Informational
svrTrapCtrlBGIRateChanged	10199	BGI rate changed	Informational
svrTrapCtrlCacheDiscarded	10200	Adapter cache discarded due to memory/BBU problems	Informational
svrTrapCtrlCacheRebootCantRecover	10201	Unable to recover cache data due to configuration mismatch	Major
svrTrapCtrlCacheRebootRecover	10202	Cache data recovered successfully	Informational
svrTrapCtrlCacheVersionMismatch	10203	Adapter cache discarded due to firmware version IOncompatibility	Minor
svrTrapCtrlCrash	10204	Fatal firmware error: [..]	Critical
svrTrapCtrlFactoryDefaults	10205	Factory defaults restored	Informational
svrTrapCtrlFlashBadImage	10206	Flash downloaded image corrupt	Major
svrTrapCtrlFlashEraseError	10207	Flash erase error	Major
svrTrapCtrlFlashEraseTimeout	10208	Flash timeout during erase	Major
svrTrapCtrlFlashGeneralError	10209	Flash error	Major
svrTrapCtrlFlashImage	10210	Flashing image: [..]	Informational
svrTrapCtrlFlashOK	10211		Informational

		Flash of new firmware image(s) complete	
svrTrapCtrlFlashProgramError	10212	Flash programming error	Major
svrTrapCtrlFlashProgramTimeout	10213	Flash timeout during programming	Major
svrTrapCtrlFlashUnknownChipType	10214	Flash chip type unknown	Minor
svrTrapCtrlFlashUnknownCmdSet	10215	Flash command set unknown	Major
svrTrapCtrlFlashVerifyFailure	10216	Flash verification failure	Major
svrTrapCtrlFlushRateChanged	10217	Flush rate changed to [..] seconds	Informational
svrTrapCtrlHibernate	10218	Hibernate command received from host	Informational
svrTrapCtrlLogCleared	10219	Event log cleared	Informational
svrTrapCtrlLogWrapped	10220	Event log wrapped	Informational
svrTrapCtrlMemECCMultiBit	10221	Multi−bit ECC error: ECAR=[..], ELOG=[..], ([..])	Major
svrTrapCtrlMemECCSingleBit	10222	Single−bit ECC error: ECAR=[..], ELOG=[..], ([..])	Major
svrTrapCtrlNotEnoughMemory	10223	Not enough adapter memory	Major
svrTrapCtrlPrRateChanged	10224	Patrol Read rate changed to [..]%	Informational
svrTrapCtrlReconRateChanged	10225	Migration rate changed to [..]%	Informational
svrTrapCtrlShutdown	10226	Shutdown command received from host	Informational
svrTrapCtrlTest	10227	Test event: '[..]'	Informational
svrTrapCTrlTimeSet	10228	Time established as [..]; ([..] seconds since power on)	Informational
svrTrapCtrlUserEnteredDebugger	10229	User entered firmware debugger	Informational
svrTrapLDBGICorrectedMediumError	10230	BGI corrected medium error (logical drive [..] at LBA [..] on physical drive ([..]) at LBA [..])	Informational
svrTrapLDBGIDoneErrors	10231	BGI completed with uncorrectable errors on logical drive [..]	Major
svrTrapLDBGIDoubleMediumErrors	10232	BGI detected uncorrectable multiple medium errors (physical drive ([..]) at LBA [..] on logical drive [..])	Major
svrTrapLDBGIFailed	10233	BGI failed on logical drive [..]	Major

svrTrapLDBGIProgress	10234	BGI progress on logical drive [..] is [..]	Informational
svrTrapLDCachePolicyChange	10235	Logical drive [..]: [..] changed	Informational
svrTrapLDMDCCorrectedMediumError	10236	MDC corrected medium error (logical drive [..] at LBA [..] on physical drive ([..]) at LBA [..])	Informational
svrTrapLDCCInconsistentParity	10237	Consistency check found inconsistent parity on logical drive [..] at stripe [..]	Major
svrTrapLDCCInconsistentParityLoggingDisabled	10238	Consistency check logging disabled on logical drive [..] (too many Inconsistencies)	Informational
svrTrapLDCCProgress	10239	Consistency check progress on [..] is [..]	Informational
svrTrapLDInitFailed	10240	Initialization failed on logical drive [..]	Major
svrTrapLDInitProgress	10241	Initialization progress on logical drive [..] is [..]	Informational
svrTrapLDInitStartFast	10242	Fast initialization started on logical drive [..]	Informational
svrTrapLDInitStartFull	10243	Full initialization started on logical drive [..]	Informational
svrTrapLDPropChange	10244	Logical drive [..]: Property [..] updated	Informational
svrTrapLDReconDoubleMediumErrors	10245	Migration detected uncorrectable multiple medium errors (logical drive [..] at LBA [..] on physical drive ([..]) at LBA [..])	Major
svrTrapLDReconProgress	10246	Migration progress on logical drive [..] is [..]	Informational
svrTrapLDReconResume	10247	Migration resumed on logical drive [..]	Informational
svrTrapLDReconResumeFailed	10248	Resume migration of logical drive [..] failed due to Configuration Mismatch	Major
svrTrapLDStateChangedOpToOp	10249	State change on logical drive [..] from operational to operational	Informational
svrTrapPDClearAborted	10250	Clear aborted on physical drive ([..])	Minor
svrTrapPDClearFailed	10251	Clear failed on physical drive ([..]) (error [..])	Major
svrTrapLDClearProgress	10252		Informational

		Clear progress on physical drive ([..]) is [..]	
svrTrapPDClearStarted	10253	Clear started on physical drive ([..])	Informational
svrTrapPDClearSuccessful	10254	Clear completed on physical drive ([..])	Informational
svrTrapPDErr	10255	Error on physical drive ([..]) (error [..])	Major
svrTrapPDFormatComplete	10256	Format complete on physical drive ([..])	Informational
svrTrapPDFormatStarted	10257	Format started on physical drive ([..])	Informational
svrTrapPDHSSmartPollFailed	10258	Hot spare S.M.A.R.T. polling failed on physical drive ([..]) (error [..])	Major
svrTrapPDNotSupported	10259	Physical drive ([..]) is not supported	Major
svrTrapPDPRCorrected	10260	Patrol Read corrected medium error on physical drive ([..]) at LBA [..]	Informational
svrTrapPDPRProgress	10261	Patrol Read progress on physical drive ([..]) is [..]	Informational
svrTrapPDPRUncorrectable	10262	Patrol Read found an uncorrectable medium error on physical drive ([..]) at LBA [..]	Major
svrTrapPDPredictiveThresholdExceeded	10263	Predictive failure: Physical drive ([..])	Minor
svrTrapPDPuncture	10264	Puncturing bad block on physical drive ([..]) at LBA [..]	Major
svrTrapPDRbldAbortByUser	10265	Rebuild aborted by user on physical drive ([..])	Minor
svrTrapPDRbldDoneLD	10266	Rebuild complete on logical drive [..]	Informational
svrTrapPDRbldDonePD	10267	Rebuild complete on physical drive ([..])	Informational
svrTrapPDRbldProgress	10268	Rebuild progress on physical drive ([..]) is [..]	Informational
svrTrapPDRbldResume	10269	Rebuild resumed on physical drive ([..])	Informational
svrTrapPDRbldStartAuto	10270	Rebuild automatically started on physical drive ([..])	Informational
svrTrapPDRbldStopByOwnershipLoss	10271	Rebuild stopped on physical	Major

		drive ([..]) due to loss of cluster ownerhsip	
svrTrapPDReassignWriteFailed	10272	Reassign write operation failed on physical drive ([..]) at LBA [..]	Major
svrTrapPDRebuildMediumError	10273	Unrecoverable medium error during rebuild on physical drive ([..]) at LBA [..]	Major
svrTrapPDRecCorrecting	10274	Corrected medium error during recovery on physical drive ([..]) at LBA [..]	Informational
svrTrapPDRecoverMediumError	10275	Unrecoverable medium error during recovery on physical drive ([..]) at LBA [..]	Major
svrTrapPDSense	10276	Unexpected sense: Physical drive ([..]), CDB:[..], Sense:[..]	Informational
svrTrapPDStateChangeAvailToAvail	10277	State change on physical drive ([..]) from available to available	Informational
svrTrapPDStateChangeByUserAvailToAvail	10278	State change by user on physical drive ([..]) from available to available	Informational
svrTrapPDRedundantPathBroken	10279	Redundant path to physical drive ([..]) broken	Major
svrTrapPDRedundantPathRestored	10280	Redundant path to physical drive ([..]) restored	Informational
svrTrapPDDedicatedSpareNoLongerUseful	10281	Dedicated hot spare ([..]) no longer useful due to deleted array	Minor
svrTrapSASTolologyLoopDetected	10282	SAS topology error: Loop detected	Minor
svrTrapSASTopologyUnaddressableDevice	10283	SAS topology error: Unaddressable device	Minor
svrTrapSASTopologyMultiplePortsToSameAddr	10284	SAS topology error: Multiple ports to the same SAS address	Minor
svrTrapSASTopologyExpanderErr	10285	SAS topology error: Expander error	Minor
svrTrapSASTopologySMPTimeout	10286	SAS topology error: SMP timeout	Minor
svrTrapSASTopologyOutOfRouteEntries	10287	SAS topology error: Out of route entries	Minor
svrTrapSASTopologyIndexNotFound	10288	SAS topology error: Index not found	Minor

svrTrapSASTopologySMPFunctionFailed	10289	SAS topology error: SMP function failed	Minor
svrTrapSASTopologySMPCRCError	10290	SAS topology error: SMP CRC error	Minor
svrTrapSASTopologyMultipleSubtractive	10291	SAS topology error: Multiple subtractive	Minor
svrTrapSASTopologyTableToTable	10292	SAS topology error: Table to table	Minor
svrTrapSASTopologyMultiplePaths	10293	SAS topology error: Multiple paths	Minor
svrTrapPDUnusable	10294	Unable to access physical drive ([..])	Major
svrTrapPDSpareDedicatedNotUsefulForAllArrays	10295	Dedicated hot spare not useful for all arrays	Minor
svrTrapPDSpareGlobalNotCoveringAllArrays	10296	Global hot spare does not cover all arrays	Minor
svrTrapLDInconsistentDueAtStartup	10297	Marking logical drive [..] inconsistent due to active writes at shutdown	Minor
svrTrapBBUPresent	10298	BBU present	Informational
svrTrapBBUNotPresent	10299	BBU not present	Informational
svrTrapBBUNewBatteryDetected	10300	New BBU detected	Informational
svrTrapBBUReplaced	10301	BBU has been replaced	Informational
svrTrapBBUTemperatureNormal	10302	BBU temperature is normal	Informational
svrTrapBBUReplacementNeededSOHBad	10303	BBU needs to be replaced − SOH bad	Minor
svrTrapBBURelearnStarted	10304	BBU relearn started	Informational
svrTrapBBURelearnInProgress	10305	BBU relearn in progress	Informational
svrTrapBBURelearnComplete	10306	BBU relearn completed	Informational
svrTrapBBURelearnTimeout	10307	BBU relearn timed out	Minor
svrTrapBBURelearnPending	10308	BBU relearn pending: BBU is under charge	Informational
svrTrapBBUrelearnPostponed	10309	BBU relearn postponed	Informational
svrTrapBBURelearnWillStartIn4Days	10310	BBU relearn will start in 4 days	Informational
svrTrapBBURelearnWillStartIn2Days	10311	BBU relearn will start in 2 day	Informational
svrTrapBBURelearnWillStartIn1Days	10312	BBU relearn will start in 1 day	Informational
svrTrapBBURelearnWillStartIn5Hours	10313	BBU Relearn will start in 5 hours	Informational
svrTrapBBUBatteryRemoved	10314	BBU removed	Minor

svrTrapEnclDiscoveredSES	10315	Enclosure (SES) discovered on [..]	Informational
svrTrapEnclDiscoveredSAFTE	10316	Enclosure (SAF−TE) discovered on [..]	Informational
svrTrapEnclCommunicationLost	10317	Enclosure [..] communication lost	Minor
svrTrapEnclCommunicationRestored	10318	Enclosure [..] communication restored	Informational
svrTrapEnclFanInserted	10319	Enclosure [..] fan [..] inserted	Informational
svrTrapEnclFanRemoved	10320	Enclosure [..] fan [..] removed	Major
svrTrapEnclSIMFailed	10321	Enclosure [..] EMM [..] failed	Major
svrTrapEnclSIMInserted	10322	Enclosure [..] EMM [..] inserted	Informational
svrTrapEnclSimRemoved	10323	Enclosure [..] EMM [..] removed	Major
svrTrapEnclShutdown	10324	Enclosure [..] shutdown	Minor
svrTrapEnclMaxPerPortExceeded	10325	Enclosure [..] not supported; too many enclosures connected to port	Minor
svrTrapEnclFirmwareMismatch	10326	Enclosure [..] firmware mismatch (EMM [..])	Minor
svrTrapEnclBadSensor	10327	Enclosure [..] sensor [..] bad	Major
svrTrapEnclBadPhy	10328	Enclosure [..] phy bad for slot [..]	Minor
svrTrapEnclUnstable	10329	Enclosure [..] is unstable	Minor
svrTrapEnclHardwareError	10330	Enclosure [..] hardware error	Minor
svrTrapEnclNotResponding	10331	Enclosure [..] not responding	Minor
svrTrapEnclSASSATAMixingDetected	10332	SAS/SATA mixing not supported in enclosure; [..] disabled	Minor
svrTrapEnclSESHotplugDetected	10333	Enclosure (SES) hot plug on [..] was detected, but is not supported	Informational
svrTrapClusterEnabled	10334	Clustering enabled	Informational
svrTrapClusterDisabled	10335	Clustering disabled	Informational
svrTrapPDTooSmallForAutoRebuild	10336	Physical drive ([..]) too small to be used for auto rebuild	Minor
svrTrapBBUGood	10337	BBU enabled; changing Write−through logical drives to Write−back	Informational
svrTrapBBUBad	10338	BBU disabled; changing Write−back logical drives to	Minor

		Write−through	
svrTrapPDBBMLog80PercentFull	10339	Bad block table on physical drive ([..]) is 80% full	Informational
svrTrapPDBBMLogFull	10340	Bad block table on physical drive ([..]) is full; unable to log Block [..]	Minor
svrTrapLDMDCOwnershipLossAbort	10341	MDC aborted due to ownership loss on logical drive [..]	Minor
svrTrapLDBGIOwnershipLossAbort	10342	BGI aborted due to ownership loss on logical drive [..]	Minor
svrTrapBBUBatterySOHInvalid	10343	BBU/charger problems detected; SOH bad	Minor
svrTrapCtrlMemECCSingleBitWarning	10344	Single−bit ECC error: ECAR=[..], ELOG=[..], ([..]); warning threshold exceeded	Minor
svrTrapCtrlMemECCSingleBitCritical	10345	Single−bit ECC error: ECAR=[..], ELOG=[..], ([..]); critical threshold exceeded	Minor
svrTrapCtrlMemECCSingleBitDisabled	10346	Single−bit ECC error: ECAR=[..], ELOG=[..], ([..]); further reporting disabled	Informational
svrTrapEnclPowerSupplyCableRemoved	10347	Enclosure [..] power supply [..] cable removed	Minor
svrTrapEnclPowerSupplyCableInserted	10348	Enclosure [..] power supply [..] cable inserted	Informational
svrTrapEnclFanReturnedToNormal	10349	Enclosure [..] fan [..] returned to normal	Informational
svrTrapDiagBBURetentionTestStartedOnPrevReboot	10350	BBU retention started on previous boot	Informational
svrTrapDiagBBURetentionPassed	10351	BBU retention test passed	Informational
svrTrapDiagBatRetentionTestFailed	10352	BBU retention test failed!	Minor
svrTrapDiagNVRAMRetTestStartedOnPrevReboot	10353	Retention test started on previous reboot	Informational
svrTrapDiagRetentionTestSuccess	10354	NVRAM retention test passed	Informational
svrTrapDiagNVRAMRentionTestFailed	10355	NVRAM retention test failed!	Minor
svrTrapDiagSelfCheckTestPass	10356	[..] test completed [..] passes successfully	Informational
svrTrapDiagSelfCheckTestFailed	10357	[..] test FAILED on [..] pass. fail data: errorOffset=[..] goodData=[..] badData=[..]	Minor
svrTrapDiagSelfCheckDone	10358		Informational

		Self−check diagnostics completed	
svrTrapForeignCfgDetected	10359	Foreign configuration detected	Informational
svrTrapForeignCfgImported	10360	Foreign configuration imported	Informational
svrTrapForeignCfgCleared	10361	Foreign configuration cleared	Informational
svrTrapNVRAMCorrupt	10362	NVRAM is corrupt; reinitializing	Minor
svrTrapNVRAMMismatch	10363	NVRAM mismatch occurred	Minor
svrTrapSASWidePortLinkLost	10364	SAS wide port [..] lost link on PHY [..]	Minor
svrTrapSASWidePortLinkRestored	10365	SAS wide port [..] restored link on PHY [..]	Informational
svrTrapSASPhyErrorRateExceeded	10366	SAS port [..], PHY [..] has exceeded the allowed error rate	Minor
svrTrapSATABadBlockRemaped	10367	Bad block reassigned on physical drive ([..]) from LBA [..] to LBA [..]	Minor
svrTrapCtrlHotplugDetected	10368	Adapter hot plug detected	Informational
svrTrapEnclTemperatureDifferential	10369	Enclosure [..] temperature sensor [..] differential detected	Warning
svrTrapDiagDiskTestCannotStart	10370	Disk test cannot start. No qualifying disks found	Informational
svrTrapDiagTimeNotSufficient	10371	Time duration provided by host is not sufficient for self−checking	Informational
svrTrapPDTMarkMissing	10372	Physical drive ([..]) on array [..] row [..] marked missing	Informational
svrTrapPDReplaceMissing	10373	Physical drive ([..]) replaced missing on array [..] row [..]	Informational
svrTrapEnclTemperatureReturnedToNormal	10374	Enclosure [..] temperature sensor [..] returned to normal	Informational
svrTrapEnclFirmwareFlashInProgress	10375	Enclosure [..] firmware download in progress	Informational
svrTrapEnclFirmwareDownloadFailed	10376	Enclosure [..] firmware download failed	Major
svrTrapPDNotCertified	10377	Physical drive ([..]) is not a certified drive	Minor
svrTrapCtrlCacheDiscardByUser	10378	Dirty cache data discarded by user	Minor
svrTrapCtrlBootMissingPDs	10379		Minor

		Physical drives missing from configuration at boot	
svrTrapCtrlBootLDsWillGoOffline	10380	Logical drives missing drives and will go offline at boot: [..]	Minor
svrTrapCtrlBootLDsMissing	10381	Logical drives missing at boot: [..]	Minor
svrTrapCtrlBootConfigMissing	10382	Previous configuration completely missing at boot	Minor
svrTrapBBUChargeComplete	10383	BBU charge complete	Informational
svrTrapEnclFanSpeedChanged	10384	Enclosure [..] fan [..] speed changed	Informational
svrTrapPDSpareDedicatedImportedAsGlobal	10385	Dedicated hot spare ([..]) imported as global due to missing arrays	Informational
svrTrapPDNoRebuildSASSATAMixNotAllowedInLD	10386	Physical drive ([..]) rebuild not possible as SAS/SATA is not supported in an array	Informational
svrTrapSEPIsBeingRebooted	10387	SEP [..] has been rebooted as a part of enclosure firmware download. SEP will be unavailable until this process is completed.	Informational
svrTrapLDPartiallyDegraded	10388	Logical drive [..] partially degraded	Major
svrTrapBBURelearnRequested	10389	BBU requires reconditioning; please initiate a LEARN cycle	Informational
svrTrapCoercionModeChanged	10390	Coercion mode changed	Informational
svrTrapBBUAutoLearnModeChanged	10391	BBU automatic learn mode changed	Informational
svrTrapBBUAutoModeLearnPeriodChanged	10392	BBU atomatic learn period changed	Informational
svrTrapBBULearnDelayIntervalChanged	10393	BBU learn delay interval changed	Informational
svrTrapBBUNextLearnTimeChanged	10394	BBU next learn time changed	Informational
svrTrapPatrolreadMaxPDChanged	10395	Max. physical drive count for Patrol Read changed to [..]	Informational
svrTrapPatrolreadContinuousPatrollingEnabled	10396	Continuous patrolling enabled	Informational
svrTrapPatrolreadContinousPatrollingDisabled	10397	Continuous patrolling disabled	Informational
svrTrapLDMDCFinishedWithErrors	10398	MDC finished with errors on logical drive [..]	Major

svrTrapLDDisabledNoSupportForRAID5	10399	Logical drive [..] disabled because RAID−5 is not supported by this RAID key	Informational
svrTrapLDDisabledNoSupportForRAID6	10400	Logical drive [..] disabled because RAID−6 is not supported by this RAID key	Informational
svrTrapLDDisabledNoSupportForSAS	10401	Logical drive [..] disabled because SAS drives are not supported by this RAID key	Minor
svrTrapCtrlBootMissingPDsExt	10402	Physical drives missing	Minor
svrTrapAdapterRebuildRateChangedEx	10403	Rebuild rate changed to [..]%	Informational
svrTrapAdapterConCheckRateChangedEx	10404	Consistency check rate changed to [..]%	Informational
svrTrapAdapterSMARTPollIntervalChangedEx	10405	S.M.A.R.T. poll interval changed to [..] min	Informational
svrTrapLDMDCStarted	10406	MDC started on logical drive [..]	Informational
svrTrapLDMDCFinished	10407	MDC finished on logical drive [..]	Informational
svrTrapLDMDCFailed	10408	MDC failed on logical drive [..]	Major
svrTrapLDMDCAborted	10409	MDC aborted on logical drive [..]	Minor
svrTrapLDMDCPaused	10410	MDC paused on logical drive [..]	Informational
svrTrapLDUninitialisedMDCStarted	10411	MDC started on uninitialized logical drive [..]	Informational
svrTrapLDStateChangedOpToDeg	10412	State change on logical drive [..] from operational to degraded	Major
svrTrapLDStateChangedOpToParDeg	10413	State change on logical drive [..] from operational to partially degraded	Major
svrTrapLDStateChangedOpToFail	10414	State change on logical drive [..] from operational to failed	Critical
svrTrapLDStateChangedDegToOp	10415	State change on logical drive [..] from degraded to operational	Informational
svrTrapLDStateChangedDegToDeg	10416	State change on logical drive [..] from degraded to degraded	Major
svrTrapLDStateChangedDegToParDeg	10417	State change on logical drive [..] from degraded to partially degraded	Major

svrTrapLDStateChangedDegToFail	10418	State change on logical drive [..] from degraded to failed	Critical
svrTrapLDStateChangedParDegToOp	10419	State change on logical drive [..] from partially degraded to operational	Informational
svrTrapLDStateChangedParDegToDeg	10420	State change on logical drive [..] from partially degraded to degraded	Major
svrTrapLDStateChangedParDegToParDeg	10421	State change on logical drive [..] from partially degraded to partially degraded	Major
svrTrapLDStateChangedParDegToFail	10422	State change on logical drive [..] from partially degraded to failed	Critical
svrTrapLDStateChangedFailToOp	10423	State change on logical drive [..] from failed to operational	Informational
svrTrapLDStateChangedFailToDeg	10424	State change on logical drive [..] from failed to degraded	Major
svrTrapLDStateChangedFailToParDeg	10425	State change on logical drive [..] from failed to partially degraded	Major
svrTrapLDStateChangedFailToFail	10426	State change on logical drive [..] from failed to failed	Critical
svrTrapPDStateChangeByUserAvailToFail	10427	State change by user on physical drive ([..]) from available to failed	Critical
svrTrapPDStateChangeByUserAvailToHS	10428	State change by user on physical drive ([..]) from available to hot spare	Informational
svrTrapPDStateChangeByUserAvailToRbld	10429	State change by user on physical drive ([..]) from available to rebuilding	Informational
svrTrapPDStateChangeByUserAvailToOp	10430	State change by user on physical drive ([..]) from available to operational	Informational
svrTrapPDStateChangeByUserFailToAvail	10431	State change by user on physical drive ([..]) from failed to available	Informational
svrTrapPDStateChangeByUserFailToFail	10432	State change by user on physical drive ([..]) from failed to failed	Critical
svrTrapPDStateChangeByUserFailToHS	10433	State change by user on physical drive ([..]) from failed to hot spare	Informational
svrTrapPDStateChangeByUserFailToRbld	10434	State change by user on	Informational

		physical drive ([..]) from failed to rebuilding	
svrTrapPDStateChangeByUserFailToOp	10435	State change by user on physical drive ([..]) from failed to operational	Informational
svrTrapPDStateChangeByUserHSToAvail	10436	State change by user on physical drive ([..]) from hot spare to available	Informational
svrTrapPDStateChangeByUserHSToFail	10437	State change by user on physical drive ([..]) from hot spare to failed	Critical
svrTrapPDStateChangeByUserHSToHS	10438	State change by user on physical drive ([..]) from hot spare to hot spare	Informational
svrTrapPDStateChangeByUserHSToRbld	10439	State change by user on physical drive ([..]) from hot spare to rebuilding	Informational
svrTrapPDStateChangeByUserHSToOp	10440	State change by user on physical drive ([..]) from hot spare to operational	Informational
svrTrapPDStateChangeByUserRbldToAvail	10441	State change by user on physical drive ([..]) from rebuilding to available	Informational
svrTrapPDStateChangeByUserRbldToFail	10442	State change by user on physical drive ([..]) from rebuilding to failed	Critical
svrTrapPDStateChangeByUserRbldToHS	10443	State change by user on physical drive ([..]) from rebuilding to hot spare	Informational
svrTrapPDStateChangeByUserRbldToRbld	10444	State change by user on physical drive ([..]) from rebuilding to rebuilding	Informational
svrTrapPDStateChangeByUserRbldToOp	10445	State change by user on physical drive ([..]) from rebuilding to operational	Informational
svrTrapPDStateChangeByUserOpToAvail	10446	State change by user on physical drive ([..]) from operational to available	Informational
svrTrapPDStateChangeByUserOpToFail	10447	State change by user on physical drive ([..]) from operational to failed	Critical
svrTrapPDStateChangeByUserOpToHS	10448	State change by user on physical drive ([..]) from operational to hot spare	Informational
svrTrapPDStateChangeByUserOpToRbld	10449	State change by user on physical drive ([..]) from	Informational

		operational to rebuilding	
svrTrapPDStateChangeByUserOpToOp	10450	State change by user on physical drive ([..]) from operational to operational	Informational
svrTrapPDStateChangeAvailToFail	10451	State change on physical drive ([..]) from available to failed	Critical
svrTrapPDStateChangeAvailToHS	10452	State change on physical drive ([..]) from available to hot spare	Informational
svrTrapPDStateChangeAvailToRbld	10453	State change on physical drive ([..]) from available to rebuilding	Informational
svrTrapPDStateChangeAvailToOp	10454	State change on physical drive ([..]) from available to operational	Informational
svrTrapPDStateChangeFailToAvail	10455	State change on physical drive ([..]) from failed to available	Informational
svrTrapPDStateChangeFailToFail	10456	State change on physical drive ([..]) from failed to failed	Critical
svrTrapPDStateChangeFailToHS	10457	State change on physical drive ([..]) from failed to hot spare	Informational
svrTrapPDStateChangeFailToRbld	10458	State change on physical drive ([..]) from failed to rebuilding	Informational
svrTrapPDStateChangeFailToOp	10459	State change on physical drive ([..]) from failed to operational	Informational
svrTrapPDStateChangeHSToAvail	10460	State change on physical drive ([..]) from hot spare to available	Informational
svrTrapPDStateChangeHSToFail	10461	State change on physical drive ([..]) from hot spare to failed	Critical
svrTrapPDStateChangeHSToHS	10462	State change on physical drive ([..]) from hot spare to hot spare	Informational
svrTrapPDStateChangeHSToRbld	10463	State change on physical drive ([..]) from hot spare to rebuilding	Informational
svrTrapPDStateChangeHSToOp	10464	State change on physical drive ([..]) from hot spare to operational	Informational

svrTrapPDStateChangeRbldToAvail	10465	State change on physical drive ([..]) from rebuilding to available	Informational
svrTrapPDStateChangeRbldToFail	10466	State change on physical drive ([..]) from rebuilding to failed	Critical
svrTrapPDStateChangeRbldToHS	10467	State change on physical drive ([..]) from rebuilding to hot spare	Informational
svrTrapPDStateChangeRbldToRbld	10468	State change on physical drive ([..]) from rebuilding to rebuilding	Informational
svrTrapPDStateChangeRbldToOp	10469	State change on physical drive ([..]) from rebuilding to operational	Informational
svrTrapPDStateChangeOpToAvail	10470	State change on physical drive ([..]) from operational to available	Informational
svrTrapPDStateChangeOpToFail	10471	State change on physical drive ([..]) from operational to failed	Critical
svrTrapPDStateChangeOpToHS	10472	State change on physical drive ([..]) from operational to hot spare	Informational
svrTrapPDStateChangeOpToRbld	10473	State change on physical drive ([..]) from operational to rebuilding	Informational
svrTrapPDStateChangeOpToOp	10474	State change on physical drive ([..]) from operational to operational	Informational
svrTrapLDMDCDoubleMediumErrorsDetected	10475	MDC detected uncorrectable multiple medium errors (physical drive ([..]) at LBA [..] on logical drive [..])	Major
svrTrapPDMissingAfterReboot	10476	Physical drive ([..]) missing after reboot	Major
svrTrapLDMissingAfterReboot	10477	Logical drive ([..]) missing after reboot	Major
svrTrapPDAppearedAfterReboot	10478	Physical drive ([..]) appeared new after reboot	Informational
svrTrapLDAppearedAfterReboot	10479	Logical drive [..] appeared new after reboot	Informational
svrTrapCtrlPunctureEnabled	10480	Puncturing of LBAs enabled	Major
svrTrapCtrlPunctureDisabled	10481	Puncturing of LBAs disabled	Major
svrTrapEnclSimNotInstalled	10482		Critical

		Enclosure [..] EMM [..] not installed	
svrTrapPackageVersion	10483	Package version [..]	Informational
svrTrapLDMVCorrectedMediumError	10484	Media verification corrected error (logical drive [..] at LBA [..] on physical drive ([..]) at LBA [..])	Informational
svrTrapPDStateChangeAvailToOffline	10485	State change on physical drive ([..]) from available to offline	Informational
svrTrapPDStateChangeByUserAvailToOffline	10486	State change by user on physical drive ([..]) from available to offline	Informational
svrTrapPDStateChangeByUserFailToOffline	10487	State change by user on physical drive ([..]) from failed to offline	Informational
svrTrapPDStateChangeByUserHotspareToOffline	10488	State change by user on physical drive ([..]) from hot spare to offline	Minor
svrTrapPDStateChangeByUserOfflineToAvail	10489	State change by user on physical drive ([..]) from offline to available	Informational
svrTrapPDStateChangeByUserOfflineToFail	10490	State change by user on physical drive ([..]) from offline to failed	Major
svrTrapPDStateChangeByUserOfflineToHotspare	10491	State change by user on physical drive ([..]) from offline to hot spare	Informational
svrTrapPDStateChangeByUserOfflineToOffline	10492	State change by user on physical drive ([..]) from offline to offline	Informational
svrTrapPDStateChangeByUserOfflineToOp	10493	State change by user on physical drive ([..]) from offline to operational	Informational
svrTrapPDStateChangeByUserOfflineToRbld	10494	State change by user on physical drive ([..]) from offline to rebuilding	Informational
svrTrapPDStateChangeByUserOpToOffline	10495	State change by user on physical drive ([..]) from operational to offline	Minor
svrTrapPDStateChangeByUserRbldToOffline	10496	State change by user on physical drive ([..]) from rebuilding to offline	Minor
svrTrapPDStateChangeFailToOffline	10497	State change on physical drive ([..]) from failed to offline	Informational

svrTrapPDStateChangeHSToOffline	10498	State change on physical drive ([..]) from hot spare to offline	Minor
svrTrapPDStateChangeOfflineToAvail	10499	State change on physical drive ([..]) from offline to available	Informational
svrTrapPDStateChangeOfflineToFail	10500	State change on physical drive ([..]) from offline to failed	Major
svrTrapPDStateChangeOfflineToHS	10501	State change on physical drive ([..]) from offline to hot spare	Informational
svrTrapPDStateChangeOfflineToOffline	10502	State change on physical drive ([..]) from offline to offline	Informational
svrTrapPDStateChangeOfflineToOp	10503	State change on physical drive ([..]) from offline to operational	Informational
svrTrapPDStateChangeOfflineToRbld	10504	State change on physical drive ([..]) from offline to rebuilding	Informational
svrTrapPDStateChangeOpToOffline	10505	State change on physical drive ([..]) from operational to offline	Minor
svrTrapPDStateChangeRbldToOffline	10506	State change on physical drive ([..]) from rebuilding to offline	Minor
svrTrapCacheFlushed	10507	Data in cache flushed during power up	Informational
svrTrapCacheNotFlushed	10508	Data in cache not flushed during power up	Major
svrTrapRebuildResumed	10509	Rebuild on physical drive ([..]) resumed	Informational
svrTrapAutoRebuildStarted	10510	Automatic rebuild started on logical drive [..]	Informational
svrTrapBGIRestarted	10511	BGI restarted on logical drive [..]	Informational
svrTrapLDPDMediaError	10512	Logical drive [..]: Error on physical disk [..] [..]	Major
svrTrapLDRebuildResumed	10513	Rebuild on logical drive [..] resumed	Informational

9 Help

9.1 Help

You can access the help system by clicking on *Help* on the right of the 1st menu line.

Here you can use *Contents and Index* to start an independent browser session in which you can view this help online. The menu item *Info about ServerView RAID* provides you with version information on the product.

An introdution to the online help and which options you can use there is contained under **Help** in the table of contents.

9.2 Online Help

To be able to use the help effectively you should familiarize yourself briefly with the navigation. The online help window consists of four areas: *Header*, *Navigation Bar*, *Overview* and *Description Field*. The areas contain some functions which are described below.

<table>
<tr><td colspan="2">Header</td></tr>
<tr><td rowspan="2">Overview</td><td>Navigation Bar</td></tr>
<tr><td>Description Field</td></tr>
</table>

9.2.1 Header

The header contains the logo.

9.2.2 Navigation Bar

-

  These buttons enable you to activate and deactivate the **Overview**.

-

  This button enables you to open the table of contents for the help.

  Individual help topics are selected and pulled down in the table of contents using .
  All help topics are opened with and closed with .
  The individual help texts in the help topics are displayed by clicking on in the **Description Field**.

- A-Z

This button enables you to open the glossary for the help.

You search for the required keyword by selecting a button or scrolling.

-

You can activate the search function in the help using this button.

After you have entered the search criterion the relevant search results are displayed in the **Description Field**.

-

This button enables you to print out the help text displayed in the **Description Field**.

-

These buttons enable you to navigate within the pages called so far.

You use them to page forward or back one page.

-

This button enables you to quit the online help and close the window.

9.2.3 Overview

The overview contains the table of contents, the glossary or the search function depending on what you selected in the **Navigation Bar**.

9.2.4 Description Field

The selected help text is displayed in the description field.

You can print out the displayed text using the button.

To print the entire help in manual format you must select the **Show Manual as PDF** entry in the table of contents, save the file if required, and then print the text using the print function in Acrobat Reader.

9.3 amCLI

amCLI is a command line interface to the ServerView_RAID daemon. It can be used to create, delete or manage RAID arrays or manage the ServerView RAID daemon itself from the command line or from a script.

At the top level, amCLI has the following command options:

−c|−−create: create a logical drive
−d|−−delete: delete last logical drive

−e|−−exec: execute a device−specific command
−m|−−migrate: migrate a RAID array to another RAID level
−l|−−list: list information
−r|−−restore: restore the state from a file
−g|−−get: get a target's property
−s|−−set: set a target's property to a given value
−w|−−write: write the current state to a file
−Z|−−zap: zap a target
−?|−−help: give a short help

Up to one of these may be specified, −?being the default.

9.3.1 Addressing scheme

All objects that can be manipulated by this command (the entire ServerView RAID subsystem, adapters, physical drives, and logical drives i.e. RAID arrays) are identified by two numbers separated by a slash (/) character: the first number specifies a *module* and the second number is a (0−based) *index*: <mod/idx>. In this documentation, such a pair of numbers is referred to as the *address* of an *object*.

Currently, the following *module* numbers are supported:

mod	Module
20	Promise TX4
21	ServerView RAID
26	LSI MegaLib
27	Promise SX4
28	Adaptec StorLib FSA
31	Adaptec StorLib IROC
32	LSI StoreLib
33	LSI StoreLibIR

Note that *index* values need not be consecutive (e.g if 20/5 and 20/7 exist, 20/6 must not necessarily exist, too), are relative to a module (i.e. 20/5 and 26/5 can both exist at the same time) and the numbering continues between adapters, logical and physical drives (i.e. 20/5 and 20/10 can be adapters, 20/6 and 20/7 can be physical drives and 20/8 and 20/9 can be logical drives).

In the following,

- SysIdx is an index of the "Server View RAID" module (i.e. *mod* will be *21*),
- AdpIdx is an index of an adapter module (i.e. <mod/AdpIdx> must be the address of an adapter),
- PDIdx is an index of a physical drive (i.e. <mod/PDIdx> must be the address of a physical drive),
- LDIdx is an index of a logical drive (i.e. <mod/LDIdx> must be the address of a logical drive), and

- idx is not restricted to a specific object type (i.e. <mod/idx> can be be the address of a module, a logical or a physical drive, as appropriate in the context).

Use amCLI −l to find the addresses of objects you wish to use.

9.3.2 Create a logical drive

Before creating a logical drive, you must decide which RAID level to use, what parameters the chosen RAID level requires and what (physical and/or logical) drives this logical drive should consist of. It is assumed here that you are familiar with the concepts of RAID and the various RAID levels.

9.3.2.1 Synopsis

amCLI [−c|−−create] <mod/AdpIdx> raid=<raidLevel> parameters <mod/PDIdx>+

9.3.2.2 Parameters

- <mod/AdpIdx>: the address of the adapter which will manage the logical drive created,

- <raidLevel>: the desired RAID level of the logical drive to be created, (at present, RAID levels 0, 1, 01, 1e, 3, 4, 5, 5e, 5ee, 6, 10, 50, 60, "concat", and "single" are supported, but not all adapters support all RAID levels and some RAID levels are only supported by a single adapter type),

- *parameters* depend upon the raidLevel chosen:
  span=<spanCount>: how many physical drives this logical drive should be spread across,
  stripe=<stripeSize>: how much data should be stored on a physical drive before continuing on the next physical drive,
  <*raidFlag*>=<flag>: additional settings that can be passed to the adapter during logical drive creation, e.g. write cache mode, readahead mode, ... (eg read_mode=adaptive)

- size=<megabytes>: the size of the resulting logical drive.

- <mod/PDIdx>+: a (non−empty) list of addresses of phyical and/or logical drives that should be used when creating the new logical drive.

Use amCLI −−help create <mod/AdpIdx> to find out which RAID−levels and parameters the specified adapter supports.

9.3.2.3 Example

To create a RAID−5 array consisting of physical drives 28/5, 28/6, and 28/7 on the Adaptec StorLib FSA adapter 28/1 with default parameters, the following command could be used:

amCLI −c 28/1 raid=5 28/5 28/6 28/7

A confirmation is then required to execute this command (the input is treated case−insensitive):

Are you sure to create a new Logical Drive on Adapter '28/1'?
Type YES to confirm _

(Note that, depending on the command interpreter used, it may be possible to pipe a "yes" into this command.)

9.3.2.4 Note

ServerView_RAID will allocate an address for the new logical drive. Use amCLI −l to determine the address.

9.3.3 Delete last logical drive

This command deletes the logical drive with the highest *logical drive ID* on a given adapter (which is usually the logical drive most recently created).

9.3.3.1 Synopsis

amCLI −d <mod/AdpIdx>

9.3.3.2 Parameters

- <mod/AdpIdx>: the address of the adapter whose most recently created logical drive should be deleted.

9.3.3.3 Example

To delete the logical drive created above immediately after having created it, use

amCLI −d 28/1

Again, an explicit confirmation is required to execute this command:

Are you sure to delete the last Logical Drive on Adapter '28/1'?
Type YES to confirm _

9.3.4 Execute operation on a device

This command starts execution of a device−specific command on a given device.

9.3.4.1 Synopsis

amCLI [−e|−−exec] <mod/idx> <operation> <param>*

9.3.4.2 Parameters

- <mod/idx>: the address of the object that should execute the operation,
- <operation>: the command to execute, and
- <param>*: a (possibly empty) list of arguments required for the given command.

To find out which operations are supported by a given object and what additional parameters they require, use

amCLI [−?|−−help] exec <mod/idx>

9.3.4.3 Examples

```
# amCLI −? exec 32/26
amCLI v2.0.13
Usage:
  −e | −−exec <32/PDIdx>   locate_device
  −e | −−exec <32/PDIdx>   stop_locate
  −e | −−exec <32/PDIdx>   create_global_hotspare
  −e | −−exec <32/PDIdx>   delete_global_hotspare
  −e | −−exec <32/PDIdx>   create_dedicated_hotspare <mod/LDIdx>
  −e | −−exec <32/PDIdx>   delete_dedicated_hotspare
  −e | −−exec <32/PDIdx>   make_online
  −e | −−exec <32/PDIdx>   make_offline
  −e | −−exec <32/PDIdx>   make_ready
  −e | −−exec <32/PDIdx>   replace_missing <mod/LDIdx>
# amCLI −e 32/26 locate_device
```

9.3.5 Migrate a logical drive to a new RAID level

This command changes the RAID level of a logical drive, if this is possible in the current configuration and if it is supported by the adapter controlling the logical drive.

9.3.5.1 Synopsis

amCLI [−m|−−migrate] <mod/LDIdx> [raid=<raidLevel>] *parameters* <mod/PDIdx>*

9.3.5.2 Parameters

- <mod/LDIdx>: the address of the logical drive to migrate,
- <raidLevel>: the desired new RAID level, and
- <mod/PDIdx>*: a (possibly empty) list of addresses of additional physical drives to use.
- *parameters* are specific to the desired new RAID level. At present, only the stripeSize can be changed during migration.

To find out which RAID levels a given logical drive can be migrated to and whether additional physical drives may be needed, use

amCLI −? migrate <mod/LDIdx>

9.3.5.3 Examples

```
# amCLI −l 32/2
32/2: Logical Drive 0, 'LogicalDrive_0', RAID−0, 69472MB
  Parents: 1
  Children: −
  Containers: 1
  Drives: 1 −−> ( 32/11 )
  Properties:
```

```
    Unique ID: PCI:Bus=2&Device=14&Function=0&ID=0
    Logical Drive Number: 0
    Name: LogicalDrive_0, settable
    Logical Size: 69472 MB
    Physical Size: 69472 MB
    RAID Level: RAID−0
    ...
# amCLI −? migrate 32/2
amCLI v2.0.13
Usage:
  −m | −−migrate 32/2
  [raid=(0|1|5)]
  (<PDIdx>)+
```

This means that logical drive 32/2 (a RAID−0 logical drive) can only be migrated to RAID levels 0, 1 or 5 and it may be possible to include additional physical drives (in this specific case they would be even required to migrate to RAID levels 1 or 5).

```
# amCLI −m 32/2 raid=1 32/8
```

A confirmation is again required:

```
Are you sure to modify Logical Drive '32/2' on Adapter '32/1'?
Type YES to confirm _
```

9.3.6 List information

This command lists information available about a given object.

9.3.6.1 Synopsis

amCLI [−l|−−list] [all|struct|<mod/idx>]

9.3.6.2 Parameters

- all lists the structure of the RAID subsystems with some information about each item
- struct, which is the default, lists the structure of the RAID subsystems without additional information, and
- <mod/idx>: the address of the object of which extensive information is required.

9.3.6.3 Example

```
# amCLI −l struct
21/3: System, 'hostname'
  32/1: SAS Adapter 0, 'LSI MegaRAID SAS PCI Express(TM) ROMB (0)'
    32/2: Logical Drive 0, 'LogicalDrive_0', RAID−0, 69472MB
    32/3: SAS Port 0
      32/11: Physical Drive 0, 'SEAGATE ST373454SS (0)', 69472MB
    32/4: SAS Port 1
```

32/12: Physical Drive 1, 'SEAGATE ST336754SS (1)', 34464MB
...

9.3.7 Restore state

This command restores the state of the RAID configuration from a file previously created by amCLI −w.

9.3.7.1 Synopsis

amCLI [−r|−−restore] <filename>

9.3.7.2 Parameters

- <filename>: the name of a file containing a description of the configuration

9.3.7.3 Example

amCLI −r OldState

Again, an explicit confirmation is required:

Are you sure to restore the configuration?
Type YES to confirm _

9.3.7.4 Warning

Restoring the state of the adapter managing the system disk may render the system unusable!

9.3.8 Get property

This command retrieves the value of a given property of a given object.

9.3.8.1 Synopsis

amCLI [−g|−−get] <mod/idx> <property>

9.3.8.2 Parameters

- <mod/idx>: the address of the object and
- <property>: the name of the property to retrieve.

Use amCLI −? get to find out which object classes support which properties in general or amCLI −? get <mod/idx> to find out which properies a specific object supports.

9.3.8.3 Examples

```
# amCLI −? get 32/2
amCLI v2.0.13
Usage:
  −g | −−get <32/LDIdx> activity
  −g | −−get <32/LDIdx> status
  −g | −−get <32/LDIdx> disk_cache_mode
  −g | −−get <32/LDIdx> bgi
  ...
# amCLI −g 32/2 status
Operational
```

9.3.9 Set property

This commands sets the given property of agiven object to a given new value.

9.3.9.1 Synopsis

amCLI [−s|−−set] <mod/idx> <property> <value>

9.3.9.2 Parameters

- <mod/idx>: the address of the object,
- <property>: the property name, and
- <value>: the new property value.

Use amCLI −? set to find out which device classes support which properties in general or amCLI −? set <mod/idx> to find out which properies a given device supports.

9.3.9.3 Examples

```
# amCLI −? set 32/2
amCLI v2.0.13
Usage:
  −s | −−set <32/LDIdx> name <string>
  ...
# amCLI −g 32/2 name
LogicalDrive_0
# amCLI −s 32/2 name 'OS disk'
# amCLI −g 32/2 name
OS disk
```

9.3.10 Write state

This command saves the internal state of a sepcified object into a given file or prints it to the standard output.

9.3.10.1 Synopsis

amCLI [−w|−−write] <mod/SysIdx> [<file>]

amCLI [−w|−−write] <mod/AdpIdx> [<file>]

9.3.10.2 Parameters

- <mod/SysIdx>: the system's address (i.e. 21/0),
- <mod/AdpIdx>: the address of an adapter,
- <file> the name of a file in which the state will be stored. If no file name is given, the state is sent to *stdout*.

9.3.10.3 Example

```
# amCLI −w 32/1
<ServerView_RAID Version="2.0.13">
  <SASAdapter UniqueID="PCI:Bus=2&amp;amp;Device=14&amp;amp;Function=0" AdapterNumber="0
...
```

9.3.11 Zap drive

This command clears an existing configuration of an adapter, e.g. deletes all logical drives, hotspares, etc.

9.3.11.1 Synopsis

amCLI [−Z|−−zap] [<mod/idx>]
(Note the upper case Z)

9.3.11.2 Parameters

- <mod/idx>: the address of an adapter. If no adapter is given, the configurations on all adapters are cleared.

9.3.11.3 Example

amCLI −Z 32/17

A confirmation is then required to execute this command (the input is treated case−insensitive):

Are you sure to zap Adapter '32/17'?
Type YES to confirm _

9.3.12 Help

The help command serves two purposes:

1. To remind the user of the syntax of the various commands and

2. to retrieve command− and object−specific options.

9.3.12.1 Synopsis

amCLI [−?|−−help] [[create | get | set | exec | migrate] [<mod/idx>]]

9.3.12.2 Parameters

Without any additional parameters, amCLI −? will just print out the syntax of all amCLI commands. As −? is the default, typing amCLI will do the same.

Additional parameters can be given to retrieve specific information about parameters of a given command when applied to a given object:

- create: show which RAID−levels and additional parameters the specified adapter supports (<mod/idx> must be the address of an adapter)
- get: show which properties can be queried with the amCLI −g command
- set: show which properties can be modified with the amCLI −s command
- exec: show information about commands available for the given object
- migrate: show which RAID−level a given logical drive can be migrated to and which additional parameters may be specified (<mod/idx> must be the address of a logical disk).

If no device is given, the syntax of the command is shown. If the address of an object is given, specific information about the execution of the command on that object is shown.

9.3.12.3 Examples

```
# amCLI −?
amCLI v2.0.13
Usage:
−c <mod/AdpIdx> raid=<raidLevel> [span=<spanCount>] [stripe=<stripeSize>]
  [<raidFlag>=<flag>] [size=<megabytes>] (<mod/PDIdx>)+
−−create <mod/AdpIdx> raid=<raidLevel> [span=<spanCount>]
  [stripe=<stripeSize>] [<raidFlag>=<flag>] [size=<megabytes>]
  (<mod/PDIdx>)+
−d <AdpIdx>
−−delete <AdpIdx>
...

# amCLI −? create
amCLI v2.0.13
Usage:
−c <mod/AdpIdx> raid=<raidLevel> [span=<spanCount>] [stripe=<stripeSize>]
  [<raidFlag>=<flag>] [size=<megabytes>] (<mod/PDIdx>)+
−−create <mod/AdpIdx> raid=<raidLevel> [span=<spanCount>]
  [stripe=<stripeSize>] [<raidFlag>=<flag>] [size=<megabytes>]
  (<mod/PDIdx>)+
```

```
# amCLI −−help create 32/17
amCLI v2.0.13
Usage:
 −c | −−create 32/17
 raid=(0|1|5|10|50)
 [span=<(RAID−0:1)|
       (RAID−1:1)|
       (RAID−5:1)|
       (RAID−10:2..8)|
       (RAID−50:2..8)>]
 [stripe=<(RAID−0:(8k|16k|32k|64k|128k)|
         (RAID−1:(8k|16k|32k|64k|128k)|
         (RAID−5:(8k|16k|32k|64k|128k)|
         (RAID−10:(8k|16k|32k|64k|128k)|
         (RAID−50:(8k|16k|32k|64k|128k)>]
 [read_mode=(adaptive|readahead|no_readahead)]
 [write_mode=(write_back|write_cache_bad_bbu|write_through)]
 [cache_mode=(cached|direct)]
 [access_mode=(read_write|read_only|blocked)]
 [init_mode=(no_initialization|normal_initialization|fast_initialization)]
 [name=<string>]
 [size=<megabytes>]
 (<PDIdx>)+
```

9.4 Frequently Asked Questions FAQs

- When you start ServerView RAID, only a red X appears in the upper left−hand corner.
  ’ Close the browser window/the browser and restart ServerView RAID (for example by reentering the URL).

- The browser suddenly no longer has contact to the server.
  ’ Check whether the service *amService* (Windows) or the daemon *amDaemon* (Linux) is running. If it is not, start it:
  ’ Windows: Via Computer Management ’ Services ’ ServerView RAID

  ’ Linux: Using the "rcaurad start" command
  ’ The service check under Linux, for instance, is executed using "ps −ef | grep amDaemon" or "/etc/xinitd/aurad status".

- The progress display in the GUI suddenly stops after you have initiated an action.
  ’ Abort the session and restart ServerView RAID.

- The expected results are not displayed in the log.
  ’ Check whether logging is released in ServerView RAID (see the property 'System Event Logging'). If this does not help, notify your service engineer.

- A logical drive cannot be deleted.
  ’ Check whether deletion is prevented by an ongoing activity (e.g. initialization). Interrupt or abort the activity and repeat the delete operation.

- What services are installed in conjunction with ServerView RAID?
  ’ The following three services are installed:
  ’ **amService**: The central service of ServerView RAID
  ’ **SpySer**: Service of LSI for accessing "LSI Embedded SATA RAID" solutions
  ’ **mr2kserv**: LSI auxiliary service for detecting plug−and−play interfaces in the Windows operating system

- What web server does ServerView RAID use?
  ’ The web interface (GUI) is made available via the service *amService*, various extension modules being loaded dynamically at runtime. No "classical" web server such as Apache runs. *amService* uses a reduced HTTP as transport protocol to permit web browsers to work with ServerView RAID.

- How can the ServerView RAID port be changed?
  ’ The 6th line of the **<*installation directory*>\bin\amDPatch.ini** file contains the entry "Port = 3173". You can change the port here. You cannot force a binding. If the port is not to be accessible from the outside, you must arrange this using the firewall.

- How can the default logging settings be changed?
  ’ The settings can be found in the **<*installation directory*>\bin\amMPX.ini** file. There you can define the logging method, file size, file name, number of files, etc.

10 Glossary

Array
A group of several hard disks on which one or more logical drives are contained is called an array.

Array Initialization
See Initialization.

ATA
AT Bus Attachment. Standard parallel interface to IDE hard disk drives which is commonly used in desktop computers and some entry−level servers. A successor of ATA is SATA (Serial ATA interface).

Automatic Rebuild
Automatic procedure which restores faulty segments on preconfigured volumes. If a drive in a SAF−TE enclosure which has no hot spare assigned should fail, a rebuild starts only when the failed drive has been replaced by a new one.

Background Initialization
In the case of background initialization of a drive the redundant logical drive can be accessed while the initialization is running.

BGI
Back**g**round **I**nitialization is a type of initialization which is started automatically in the background at low priority by an LSI controller. See also Initialization and Background Initialization .

Bus
See Channel.

Cache
Quickly accessible memory on a controller which serves as a buffer for data which is read from or written to devices.

Capacity
Total storage capacity available on a drive; often specified in megabytes or gigabytes. A distinction is made between physical and logical capacity.

Channel
Path between a controller and storage devices used for data transfer and control of information. Each channel of a controller is identified by a number between 0 and the maximum number of channels minus 1. A channel is also referred to as a port or bus.

Check
Depending on the drive type various things can be checked and the checks can therefore take different lengths of time. RAID−5 checks the data for consistency and parity and optionally corrects parity errors. RAID−1 checks whether both drives are consistent and, for a drive, whether the complete drive can be read. See also Consistency Check.

Concatenation
Connection in sequential order.

Consistency Check
An action in which the controller checks all segments of the hard disks. This determines whether the hard disks are sending back data from the blocks. In addition, the controller can use a consistency check in a redundant logical drive to repair all the data. See also Check.

Create
See Automatic Rebuild.

Dedicated Hot Spare
A physical drive which, when required, takes over the place of a failed physical drive in a specially assigned, fault−tolerant logical drive.

Degraded
A redundant logical drive in which one or more members have failed. The data is still intact, but redundancy has been impaired and is in a worse status. The logical drive and all the data are still available, but a further drive failure leads to the failure of the logical drive and loss of data. A check plus correction can return an impaired logical drive to its optimal status.

Dirty Data
Data which has been written into a cache and has not yet been updated on the actual target volume.

Drive
See Physical and Logical Drive.

Enclosure
An enclosure for physical drives which generally contains several power supplies, fans, and temperature sensors. Enclosures are normally outside the computer to which they are connected. Some computers also contain internal enclosures.

Event
Notification or warning message when changes occur in the system.

Event Log
Information on controller activities or other events are stored in a file.

Expand
Assignment of more storage space to a logical drive.

Failed
Status of a non−redundant logical drive with a single drive failure or a redundant logical drive with multiple drive failures. The status generally results in a loss of data as access to the logical drive is no longer possible.

Failed Segment
A segment which is no longer used by a logical drive because it is either logically or physically damaged.

Fast Initialization
The logical drive is available immediately, but has a special internal status. In RAID−5 and RAID−50 the write performance is affected until a check plus correction has been performed on this logical drive.

Fault−tolerant Logical Drives
Logical drives with redundant components (RAID−1, RAID−5, RAID−10, RAID−50).

Format
A process performed by the firmware in which all data on the hard disk is totally deleted.

Global Hot Spare
Volume which can replace a failed component in the logical drives on the same controller. The available storage capacity must be at least as large as that of the failed component. See also Hot Spare.

Hot Spare
A physical volume available as a replacement if a drive fails. In a redundant logical drive this permits automatic data recovery. The storage capacity available must be at least as large as that of the failed component. See also Automatic Rebuild, Global Hot Spare and Dedicated Hot Spare.

Hot Swap
Replacement of system components while the system is running.

Initialization
A fault−tolerant logical drive must be initialized before it is used. This operation deletes all blocks on the logical drive. In RAID−5 a parity is then generated on the basis of the current content of the member segments, whereas RAID−1 copies the content of the first drive (master) to a second drive (slave). Depending on the RAID type initialization runs in the background at differing speeds. In addition, Fast Initialization is also provided for immediate access to a RAID−5 drive.

Initialized Logical Drive
A logical drive which is ready for read and write operations.

Java
Java is an object−oriented, platform−independent programming language developed by Sun Microsystems. All Java programs run on a wide range of platforms without any adjustments. However, to execute, JAVA programs generally need a special runtime environment, the virtual machine, and only this environment need be adjusted to the various operating systems.

JBOD
JBOD stands for Just a Bunch Of Disks. According to the latest definition of the Storage Networking Industry Association (SNIA) a single hard disk should be understood here today, whereas earlier it referred to multiple hard disks (also referred to as concatenation).

KByte
Is a unit of information or computer storage, commonly abbreviated as "KiB" and stands for 2^{10} bytes = 1,024 bytes.

LBA
Logical Block Addressing is an addressing method for hard disks. In contrast to other methods the sectors on the hard disk are counted singly, beginning with 0.

LED
A light−emitting diode is an electronic semiconductor which is used, for example, to indicate read or write operations on hard disks. Often an LED is also used for determining the location of the drives.

Locate
An aid in uniquely identifying hard disk which consists of the controller number, the channel number, the LUN, and the SCSI−ID.

Logical Drive
A drive which consists of one or more physical drives, mostly hard disks. For the operating system, all the storage volume available constitutes a single drive.

Logical Drive Order
The order in which, at system startup, the server's operating system recognizes individual hard disks and other devices connected to the controller.

LUN
Each SCSI device can contain up to eight subdevices. A LUN is the number of the logical unit − 0 through 7 − which has been assigned to this device. However, generally only one subdevice (LUN 0) exists.

Migration
When a logical drive of a RAID type is transferred directly to another type, e.g. from RAID−1 to RAID−0, this is called migration.

Monitoring
The process for ascertaining, displaying, and logging system events.

Morphing
Process for expanding a logical drive or migrating a logical drive from one RAID type to another. This is also understood to mean modifying the stripe size in particular RAID drives or shifting a logical device segment onto another volume.

Notification
Aid used by the system for communication relating to events that have occurred.

NVRAM
A non−volatile memory which can retain information even if the power supply is not maintained. This memory is often used on RAID controllers as a memory for the configuration and for error logging.

Offline
The status of a logical or physical drive which can no longer be accessed.

Offset
The distance from the start of a drive to the start of a segment.

Optimal
A logical drive in its normal operating status in which all components are present and fully operational.

Parity
A form of redundancy which is used for checking the user data for errors. Additional data is generated from the user data which is also stored and can be used to reconstruct the original data.

Physical Drive
Generally a physical hard disk drive, also known as hard disk for short. This is a randomly accessed, rewritable data storage device.

Port
See Channel.

RAID Signature
From the RAID signature on a hard disk the RAID controller can recognize, among other things, whether the hard disk has already been initialized. In future it is to contain a complete, non−proprietary RAID configuration to make it easier to exchange drives or controllers.

RAID Volume
Two or more logical drives of the same type which need not necessarily have the same capacity are connected in a RAID volume.

RAID−0
A logical drive with one level, consisting of two equal−sized segments on different hard disk drives. RAID−0 uses the striping process to distribute the data evenly in equal−sized sections over the drives concerned.

RAID−0/1
See RAID−10.

RAID−1
A logical drive with one level, consisting of two equal−sized segments on different hard disk drives. Offers redundancy by storing the same data on both hard disks.

RAID−5
A logical drive with one level, consisting of three equal−sized segments on different hard disk drives. The capacity of one segment is used for parity data which is distributed over all the drives in equal−sized sections.

RAID−10
A logical drive. Two equal−sized RAID−1s are used to create a RAID−10. RAID−10 thus needs four physical drives.

RAID−50
A logical drive. Two equal−sized RAID−5s are used to create a RAID−50. RAID−50 thus needs six physical drives.

Reconfiguration
See Migration.

Redundancy
Redundancy is the general term to describe the additional existence of resources which are functionally identical or comparable if these are not normally required when operation is error−free. Here redundancy is used to manage data in a system with the aim of automatically replacing failed components by operational ones. For example, logical drives of the type RAID−5 are redundant because the surviving members can combine to replace the data of a failed component.

Replacement
See Hot Spare.

SAF−TE
SCSI Accessed Fault−Tolerant Enclosure.

SAS
Serial Attached SCSI is to replace the current parallel SCSI interface because the Terminators which are typical for SCSI are not required for SAS. SAS takes over the SATA connections. SATA devices can be used on SAS but not vice versa.

SATA
Serial ATA is a successor to ATA which transfers data serially instead of in parallel.

SCSI
Small Computer System Interface is a parallel high−speed communication method which permits data transfer rates of up to 320 Mbytes/s. The current specification supports up to 15 devices per channel.

SCSI ID
A unique number (0−15) which is assigned to each device on a SCSI bus.

Second Level Array
A logical drive can consists of more than one level. The logical device of the second level (lower level array in an array with two levels) is never visible for the operating system and can only be used by other logical devices. For example, a RAID−10 array's member in the top level is a RAID−0 array and in the second level two or more RAID−1 arrays.

Segment
Reserved area on a physical hard disk. A segment is always part of a logical drive and cannot be used by more than one logical drive at the same time.

S.M.A.R.T.
Self−Monitoring Analysis and Reporting Technology (S.M.A.R.T). This drive function is designed to determine the reliability status of a hard disk drive. If S.M.A.R.T. detects a potential problem that could be serious, the user is notified and receives assistance on how to rectify this problem.

Spare Drive
See Hot Spare.

Striping Process
Small, contiguous data areas which are distributed over all hard disks in the logical drive are called stripes. For example, with the striping process RAID−0 distributes the data in equal−sized sections over the drives concerned to expedite access.

Stripe Size
In logical drives using the striping process (RAID Levels 0, 5, 10 and 50) the data is distributed over the member hard disks in equal−sized sections. The amount of data in each section is the stripe size.

Temperature Warning Threshold
The temperature threshold defined by the user above which a warning message is issued.

Terminator
In a SCSI bus system both ends of the cable route must be provided with a terminator. There are two types of termination, the passive one using resistors and the active one using an internal voltage source.

Virtual Drive Order
See Logical Drive Order.